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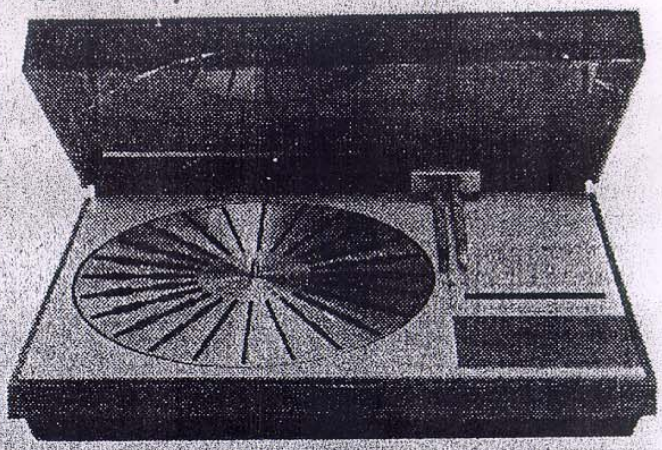

BEOGRAM 4002

TYPE 5513

BEOGRAM 4002-4004

TYPE 5523-5526 USA

SERVICE MANUAL

INTRODUCTION

This service manual comprises Beogram 4002, type 5513, which have been constructed on the basis of type 5503.
In the diagrams the components are provided with an individual position number and a co-ordinate designation, e.g. B3. This designation refers to the placing on the PC boards which are provided with a printed division into fields and with letters and figures along the edge of the PC board. Therefore there are no drawings of the PC boards in the service manual. The diagram for the CD-4 demodulator shows only one of the stereo channels and the co-ordinate designation for right channel is bracketed, e.g. B3 (C2).
The diagrams, which may be unfolded, are placed at the back of the manual so that it is possible to open at the preceding pages at the same time.
The service manual is complete and contains the paragraphs mentioned in the below table of contents. Supplementary sheets will only be made in case of essential changes.

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Electrical adjustment 4
Fault-finding 5
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Diagram - Electrical parts list - Conditions of measurement 7
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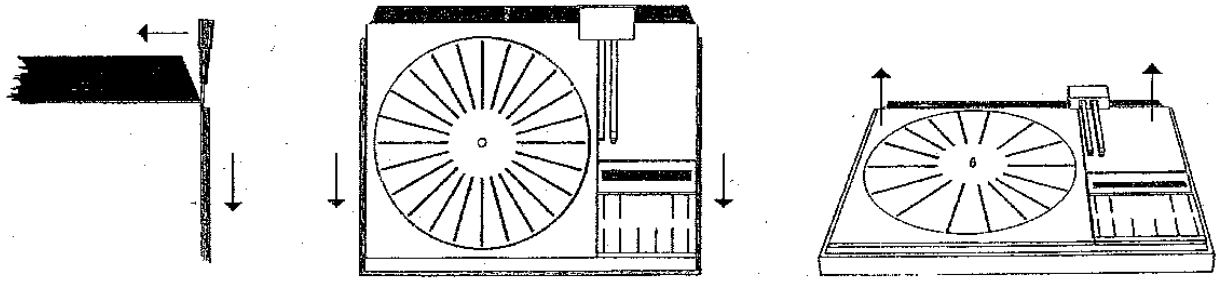
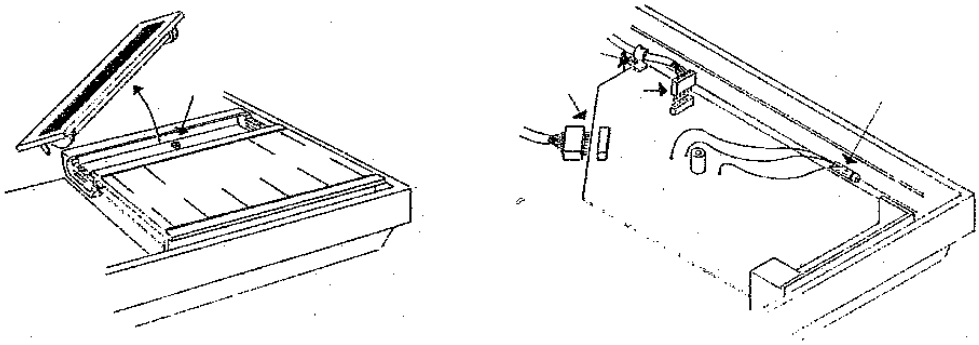
TECHNICAL DATA

	BEOGRAM 4002
Type No.	5513
Sound system	Stereo, matrix
Output	2 x 0.6 mV
Speeds	33 - 45 rpm.
Tonearm	Tangential
Automatic record-size	Yes
Automatic pickup movement	Yes
Automatic speed selection	Yes
Wow and flutter, DIN	< ± 0.05%
Wow and flutter, WRMS	< ± 0.025%
Rumble DIN unweighted	> 45 dB
Rumble DIN weighted	> 65 dB
Speed deviation	< 0.02%
Speed control range	> 6%
Dial for speed	2 pointers
Stylus pressure range	0 - 1.5 gram
Tangential tracking	< 0.04°
Lift system	Electronic
Antiskating	Parallel tracking, error angle compensated
Motor	Servo controlled DC
Drive system	Belt
Turntable	30 cm 1.3 kg
Dust cover	Hinged and detachable
Power supply	117 volts
Frequency	50 - 60 Hz
Power consumption	20 watts
Dimensions W x H x D	49 x 10 x 38 cm
Weight	11 kg
Pickup	MMC 6000
Stylus	Pramanik diamond
Radius of curvature	(CD-4 quadro)
Frequency range	20 - 15,000 Hz ± 1.5 dB
	20 - 45,000 Hz (CD-4)
Channel separation 1000 Hz	> 25 dB
400 - 10,000 Hz	> 20 dB
Channel difference	< 1.5 dB
Intermodulation	< 1%
Recommended stylus pressure	1 gram
Compliance	30 x 10^{-6} cm/dyn
Effective tip mass	0.22 mg
Output mV/cm/sec.	0.6 mV/47 kohms
Subject to change without notice	

DISASSEMBLY



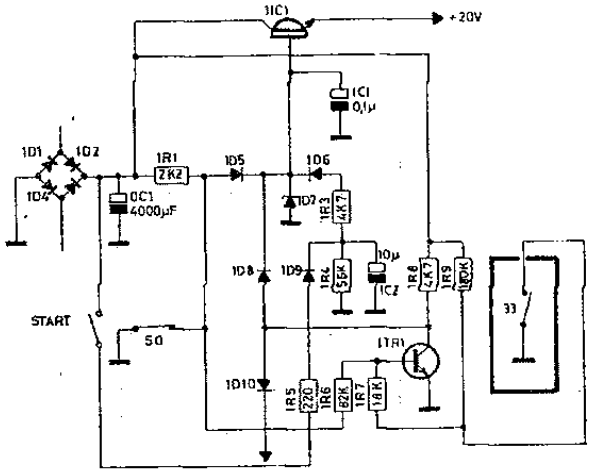


ELECTRICAL DESCRIPTION

Since the circuitry of the Beogram 4002 - 6000 type 551x is basically identical with that of the type 550x, the electrical description will give chief attention to those circuits which are fundamentally different.

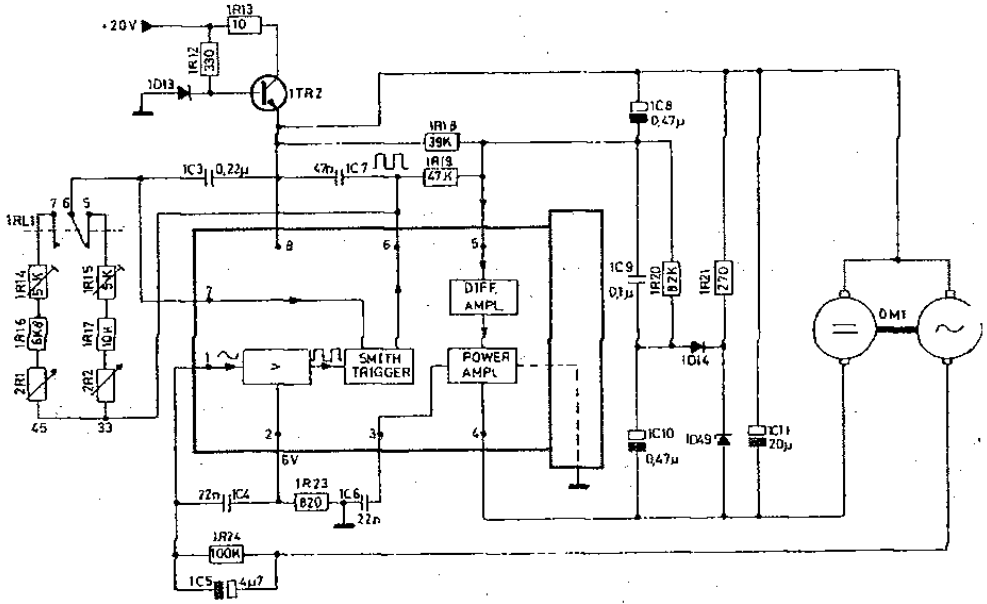
Record wiping

With 33 activated in the STAND BY mode, the turntable will rotate but the slide will not travel in, making record wiping possible.



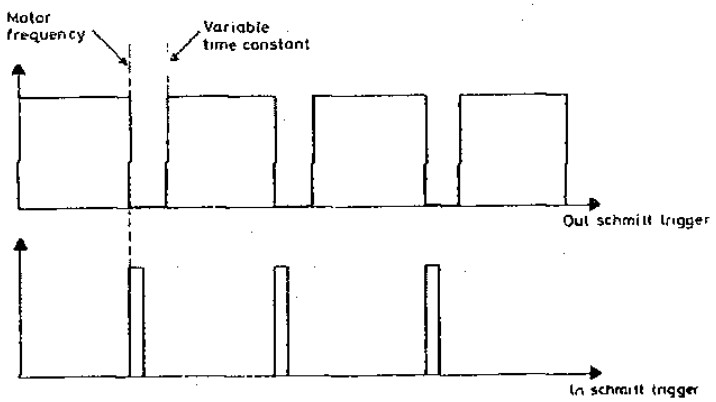
In the STAND BY mode, 1TR1 is kept forward biased through 1R9, 1R7 and 1R6. If 33 is activated, the junction of 1R9 and 1R7 is connected to chassis potential. 1TR1 is reverse biased, the collector goes high; this level is transmitted through 1D8 to the base of series transistor 1IC1 as forward bias, with the result that voltage is available from the power supply section. The high level is likewise transmitted to the electronic switch through 1D10, thus blocking the functions of the electronic switch and preventing slide transport.
The turntable will rotate only as long as 33 is activated.

Tacho control



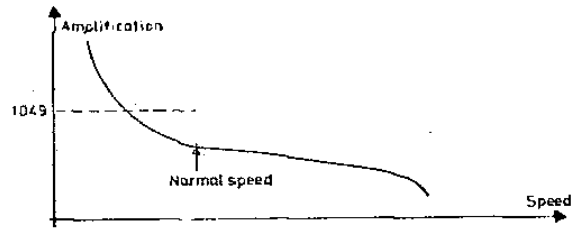
The turntable is driven by a tacho-controlled DC motor. A generator in the motor furnishes an AC voltage whose frequency is dependent on the motor speed.
This AC voltage is fed to the network 1C5 - 1R24 to pin 1 of 1IC3. The AC voltage is converted to a square, which is passed on to a Schmitt trigger.
The frequency of the square, dependent on the motor speed, controls one of

the output levels of the Schmitt trigger; the other output level is controlled from a variable time constant network consisting of 1C3 - 1R4 - 1R16 - 2R1 for 45 r.p.m. and 1C3 - 1R15 - 1R17 - 2R2 for 33 r.p.m..



The output signal of the Schmitt trigger (pin 6) is integrated across 1R19 - 1C8 and fed to pin 5 which is a differential amplifier. The integrated signal at 5 will be a DC voltage which varies with the motor speed. This DC voltage is fed via the differential amplifier to a power amplifier. The power amplifier is connected as a variable resistor to chassis potential. 1C10 - 1C9 - 1R20 provides negative feedback for the power amplifier (see sketch), preventing "overregulation".

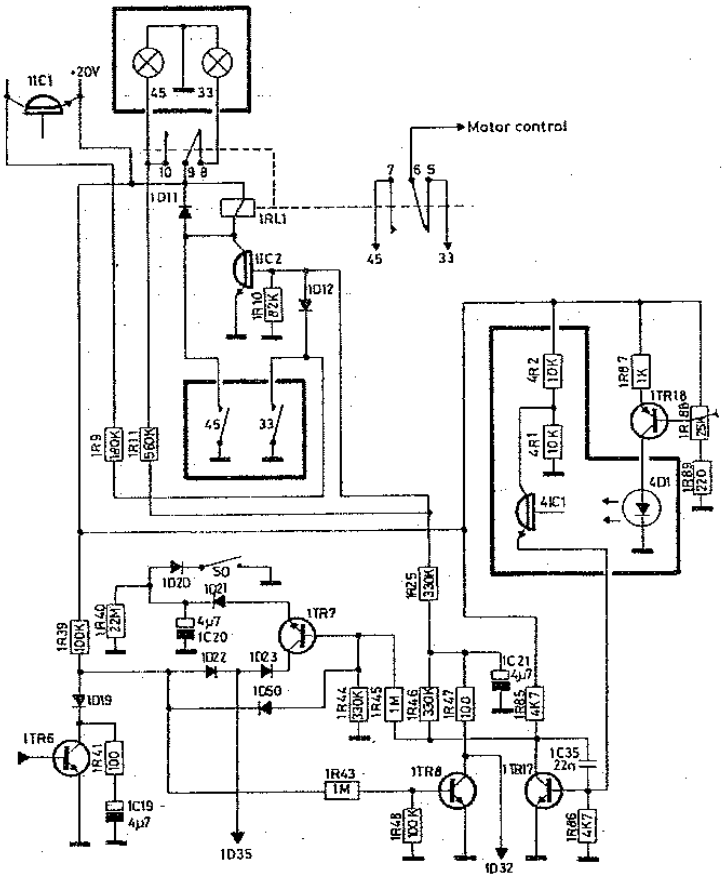
1D14 - 1D49 - 1R21 provide a guarantee that the voltage across the motor can only reach a certain value (see sketch).



When starting up from motor stand-still, the power amplifier will receive heavy drive to obtain very rapid speed increase. Approx. 8.5V is present at the anode of 1D14 so if the voltage at pin 4 goes below 4.6V, then 1D49, a 3.3V Zener diode, will be forward biased, thus preventing the voltage across the motor from exceeding approx. 4.4V so that the speed increase when starting up will not be so heavy that the motor reaches twice its wanted speed, since the motor regulating circuit is capable of taking hold at twice that speed.

The motor regulating circuit is powered with 9V via the series transistor 1TR2, controlled by 1D13. 1D13 is a 9V Zener diode.

Automatic speed-change switch, 33 - 45



We will assume as our starting point that a 17 cm record is on the turntable.

When ON is activated and the slide begins travelling in, the conditions for lowering the pickup arm are not present.

The collector of 1TR6 will be low. This low level is transmitted to the base of 1TR8 as reverse bias.
The collector of 1TR8 and hence the base of 1IC2 will float, as a result of which 1IC2 will be reverse biased and 1RL1 will be in the neutral position (the 33 r.p.m. position).

When the slide passes the position giver mark for touch-down on 30 cm, 4IC1 and hence 1TR17 are reverse biased, the collector of 1TR17 goes high, which high level will attempt to charge 1C21 of the time constant network 1R46 - 1C21, but since the 30 cm position marker is very narrow, 1C21 cannot obtain a full charge before 4IC1, and consequently 1TR17 are forward biased. Since a 17 cm record is on the turntable, the conditions for lowering the pickup arm are not yet present, and the slide will continue to travel in. The slide reaches the position marker for 25 cm lower - 17 cm speed change, 4IC1 and hence 1TR17 are again reverse biased, this time for a longer time than for 30 cm because the mark for 17 cm speed change is broader than the mark for 30 cm lower.
The high level at 1TR17 can now have time to charge 1C21, 1IC2 is forward biased, 1RL1 operates, and the speed changes to 45 r.p.m..

When the slide reaches the mark for 17 cm lower, and we have a 17 cm record on the turntable, the conditions for lowering the pickup arm are present.
The collector of 1TR6 goes high, which high level is transmitted to the base of 1TR8 as forward bias.
The collector of 1TR8 goes low, and 1IC2 is now kept forward biased through 1RL1, 1R11, 1R25 and 1TR8.

The collector of 1TR8 is connected via 1D32 to the "Motor control IN" section of the electronic switch so that automatic speed change to 45 r.p.m. can occur only while the slide is travelling in (high at the collector of 1TR12). A low level at the collector of 1TR12 places the cathode of 1D32 on chassis potential, and 1C21 cannot be charged.
When switching manually from 33 to 45 r.p.m., 45 is activated, relay 1RL1 operates, and 1IC2 is forward biased through 1RL1 and 1R11. If 33 is activated, the bias for 1IC2 is shorted to chassis through 1D12, 1IC2 is reverse biased, and 1RL1 releases.

1D12 prevents 1IC2 from being forward biased through 1R9.

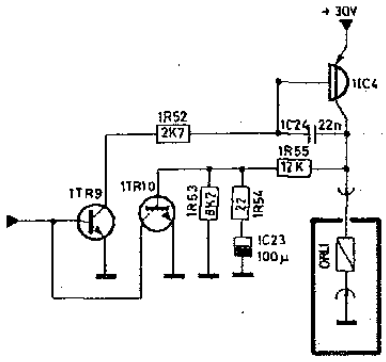
1Dll protects against induction peaks.

When the requirements for lowering the pickup have been met, the collector o 1TR6 is high; this high level is transmitted via 1D22 to the LOWER section of the electronic switch as a fixed level at the cathode of 1D35. When the slide switch passes the position giver mark, the collector of 1TR17 as mentioned before goes high; this high level is transmitted to the base of 1TR7 as forward bias. 1C20 will charge through 1D23, 1TR7 and 1D21. The charging current in 1C20 gives a negative voltage jump at the cathode of 1D22. This low pulse is fed to the electronic switch to activate its LOWER section. To ensure that 1C20 will not pick up a charge from the speed-change switch through 1D21 and 1TR7, 1D50 shorts the base of 1TR17 to chassis potential when the collector of 1TR6 is low.

1D19 and the time constant network 1R41 - 1C19 ensure that automatic lowering will not occur when the detector arm reaches in above the bright portion of the turntable (with no record on the turntable).

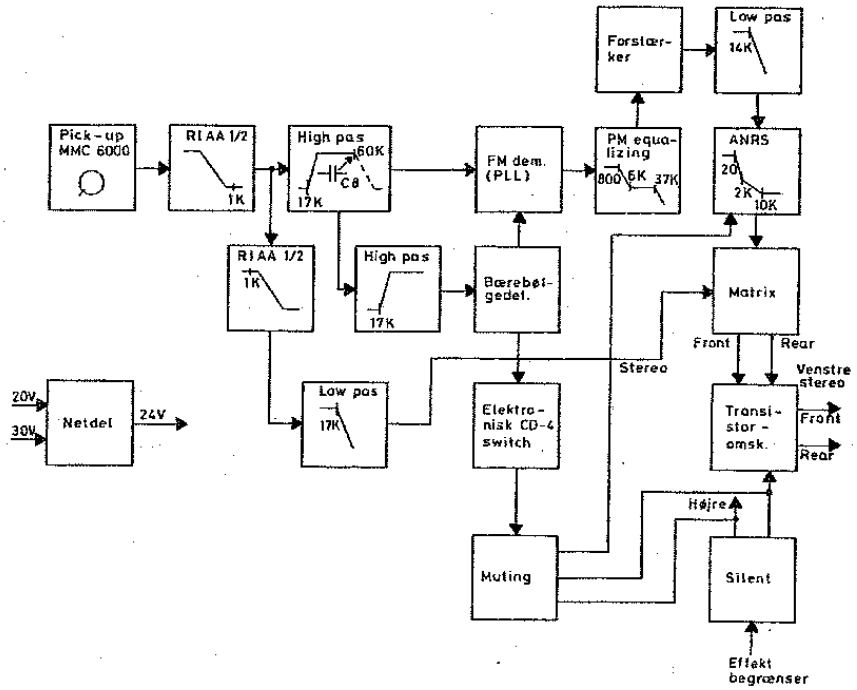
Magnet coil circuit

If a low level is applied to the base of 1TR9, 1TR9 is reverse biased, the collector is high and 1IC4 reverse biased; 0RL1 will be in the neutral position.



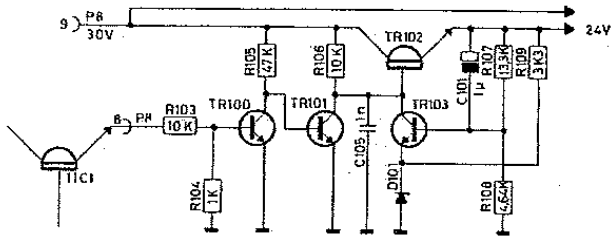
If the base of 1TR9 goes high, 1TR9 is forward biased; the collector goes low, and 1IC4 is likewise forward biased and magnet coil 0RL1 operates. Parts of the collector current of 1IC4 will charge 1C23 across 1R55 and 1R54. When 1C23 is charged to a level of approx. 0.7V, 1TR10 is forward biased. The collector current in 1TR10 will impose a load on the drive to 1TR9. 1TR9 draws less current; this limits the current in 1IC4, and hence the magnet coil, from 4 amps at the moment the magnet coil operates to approx. 150 mA. When 1C23 has accumulated a charge, 1R53 and 1R55 are connected to operate as base bias divider for 1TR10 in such a way that the higher the collector voltage at 1IC4, the higher the forward bias of 1TR10, 1TR10 draws more current, the base of 1TR9 is more heavily loaded, and the collector current in 1IC4 is limited as mentioned above. 1TR10 accordingly provides negative feedback.

DEMODULATOR



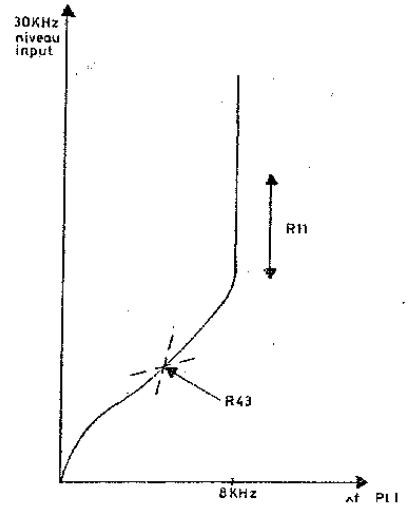
Power supply

The CD-4 demodulator has a stabilised power supply of its own which uses the power supply of the control circuits as reference.

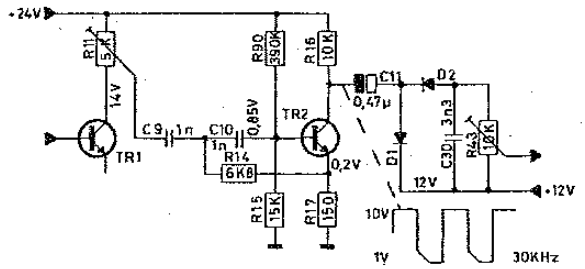


Carrier detector

The power supply series transistor, TR102, is forward biased by TR101 and TR100, whose base receives 20 V of bias. The emitter voltage of TR102 is stabilised by TR103 and D101.

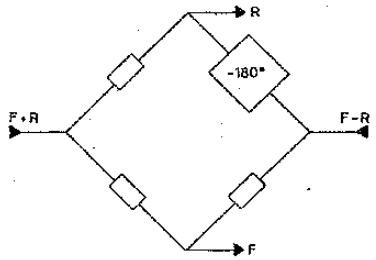


The carrier detector serves the purpose of limiting the lock-in range of the PLL if 30 kHz carrier drops out. Limiting follows the curve shown, the slope of the curve (level range) being adjusted with R43. R11 is used for selecting the 30 kHz level at which regulation starts.

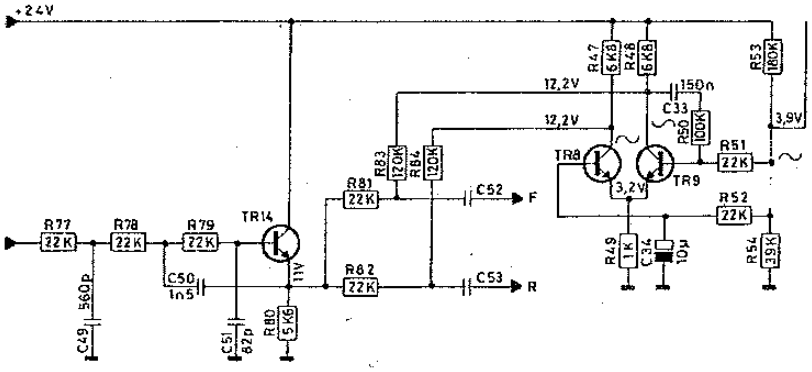


Matrix

The matrix serves the purpose of mixing the sum and difference signals in such a manner that the front and rear channels appear separately.



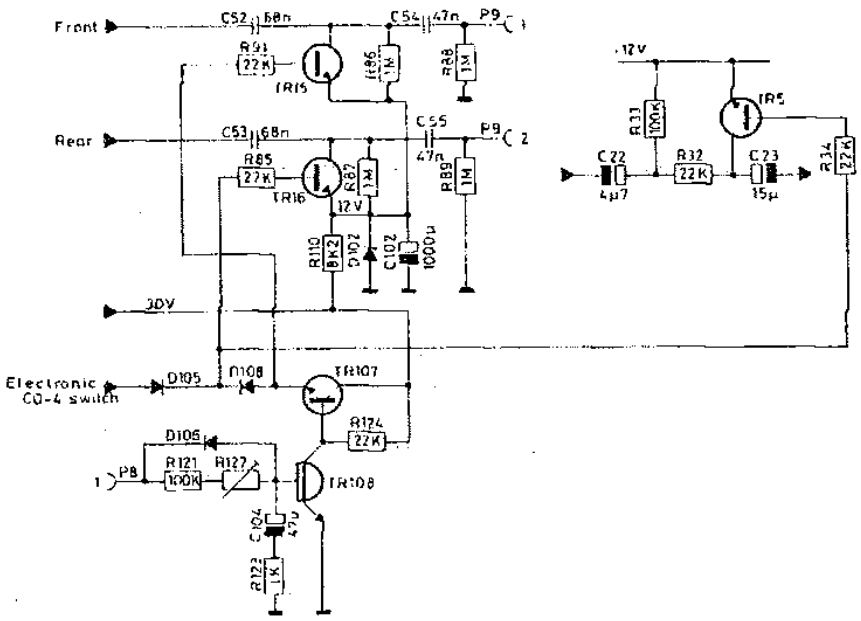
The principle of the matrix is, in one case, to add the two signals together to produce the front signal and, in the other, to subtract them so as to obtain the rear signal.



The difference signal is fed from the output of the ANRS circuit to the base of TR9. TR8 and TR9 operate as a differential amplifier. The two transistors have a common emitter resistor so that, if the current in TR9 increases, the current in TR8 will decrease commensurately and vice versa. Since the base of TR8 is shorted to chassis potential, signal-wise, we consequently obtain at the collector of TR9 a signal that is in phase opposition to the signal at the base of TR9 and, at the collector of TR8, a signal that is in phase with the signal at the base of TR9. The signals are mixed across resistors R81, R83, R82 and R84, resulting in the appearance of the F and R signals at C52 and C53, respectively.

Silent

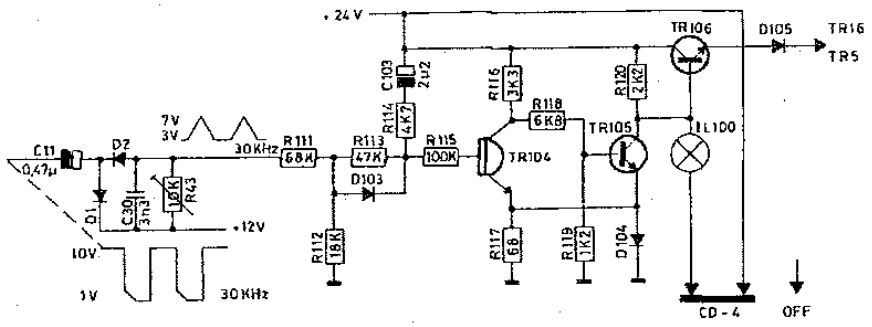
The silent circuit is to ensure that the outputs of the Beogram 6000 are silent when the pickup arm is not lowered.



When the pickup arm is lowered, approx. 17 V will be present at pin 1 of P8. The charge picked up by C104 ensures that the channels are silent while the pickup arm is being lowered. When the bias at the base of TR108 reaches approx. +1.2 V, TR108 is forward biased. The collector of TR108 goes low, TR107 is reverse biased, the emitter of TR107 goes low, and if a CD-4 record is being played, the low level at the emitter of TR107 will be transmitted to the bases of TR5, TR15 and TR16, respectively; both the front and rear channels will then be open.
If the pickup arm is raised, the voltage at pin 1 of P8 drops to 0 V. TR108 is reverse biased, the collector goes high and TR107 is forward biased. The emitter of TR107 goes high; this high level is transmitted to the base of TR15 and, via D108, to the bases of TR16 and TR5, TR15, TR16 and TR5 are forward biased so that the signal path in both front and rear channels as well as the difference signal in the ANRS circuit are shorted to chassis potential.
D106 and R123 ensure rapid discharge of C104 when the pickup arm begins to rise.

Electronic CD-4 switch

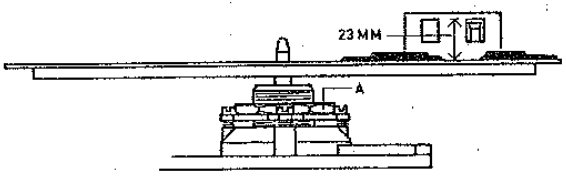
TR104 and TR105 are an electronic switch (Schmitt trigger) which is tripped by means of the 30 kHz carrier level.
The switch turns on the CD-4 indicator and opens up the rear channel when CD-4 records are played.



When a stereo record is played, 12V is present at the anode of D2. TR104 is forward biased, the collector goes low, and TR105 is reverse biased. The collector of TR105 goes high, and the CD-4 indicator IL100 is off. The high level at the collector of TR105 provides forward bias for TR106.
The emitter of TR106 goes high, which level is transmitted via D105 to the bases of TR16 and TR5 as forward bias, thereby causing the signal path in the rear channels and the difference signal in the ANRS system to be shorted to chassis potential.
When a CD-4 record is played, the carrier detector receives a 30 kHz signal; this is clamped to +12V through D1 and rectified through D2, resulting in the appearance at the anode of D2 of a DC voltage whose value will be: High 30 kHz level, low DC level, and vice versa. This DC level is applied to the base of TR104 as reverse bias, the collector goes high, and TR105 is forward biased, the collector of TR105 goes low and IL100 turns on. Simultaneously therewith, TR106 is reverse biased, the emitter of TR106 goes low, TR16 and TR5 are reverse biased, thereby opening up the signal path in the rear channels.
D104 keeps the emitter levels of TR104 and TR105 stable, enabling the switch to trip even if the filament of IL100 is open.
C103 ensures that TR104 will not be switched by noise pulses etc. If a noise pulse causes a brief drop in the voltage at the anode of D2, the voltage across C103 will increase with the result that C103 draws brief charging current through the base/emitter junction of TR104. This causes TR104 to be forward biased briefly until the voltage at the anode of D2 possibly increases again.
D103 ensures rapid discharge of C103 when the voltage at the anode of D2 increases to 12V.

MECHANICAL ADJUSTMENT

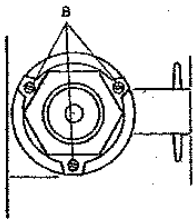
Height adjustment of turntable



Loosen nut A at turntable bearing and adjust the height of the bearing so that the separation between turntable and detector arm is 23 mm.

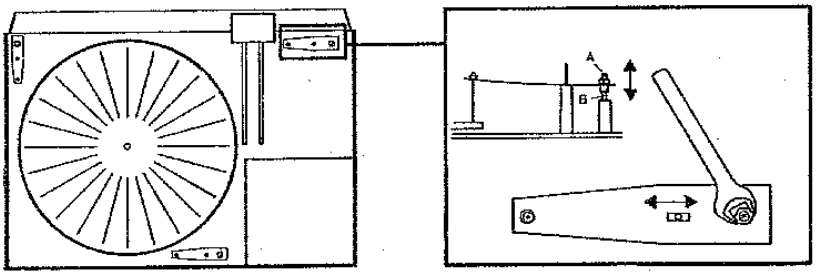
Tighten nut A

Vertical adjustment of turntable bearing



Turn the transit screws to lock the floating chassis.
With screws B adjust the turntable bearing to be perpendicular to the chassis, i.e. the surface of the turntable must be parallel with the cover plate.
Check height adjustment (23mm), both at the rim of the turntable and nearest the centre.

Height and side adjustment of chassis

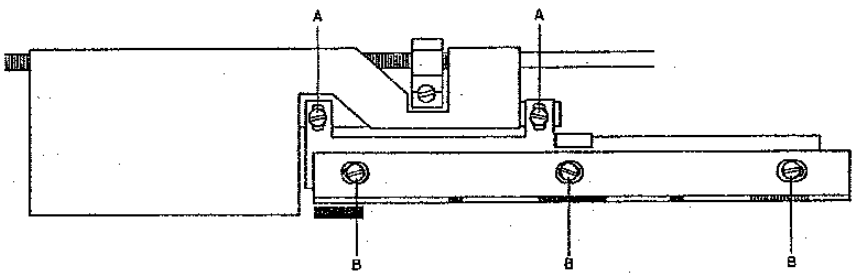


Loosen the transit screws so that the chassis floats.

By means of the spring mountings adjust the chassis so that the turntable is flush with the cover plate, with the chassis centrally located between the transit screws.

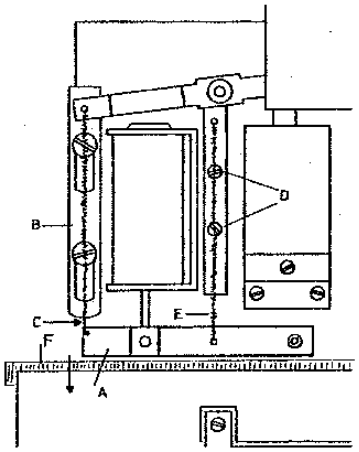
Height adjustment is performed with nut A. Sideways adjustment is performed by carefully bending the threaded pin B.

Adjustment of electronic position marker



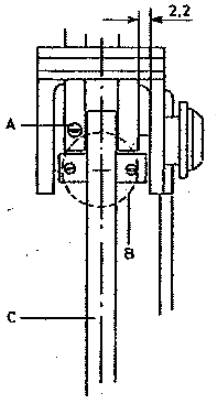
With screws A loosened, the position giver angle can be adjusted so that the position giver runs parallel with the photo resistor housing.
With screws B loosened, adjust the position marker backwards or forwards until the arm lowers on a 30 cm record between 146.5 mm and 148.25 mm from the centre of the record.

Adjustment of magnet coil system



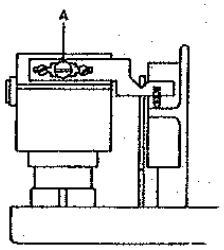
Loosen screws D. Pull arm A in the direction of the arrow until the separation between arm A and arm B at the point C is 1 mm. Move the magnet coil until the armature is the whole way down, and tighten screws D.

Horizontal placement (fixing)



Place the pickup arm in the bearing bracket so that the middle line C of the pickup arm is located in the centre line of the shaft B with an accouracy of ± 0.2 mm. Adjustment is performed by loosening screw A and sliding the pickup arm to one side or the other and thereafter retightening the screws A. Use a gauge (e.g. a 2.2 mm drill) placed as shown in the sketch.

Static balance

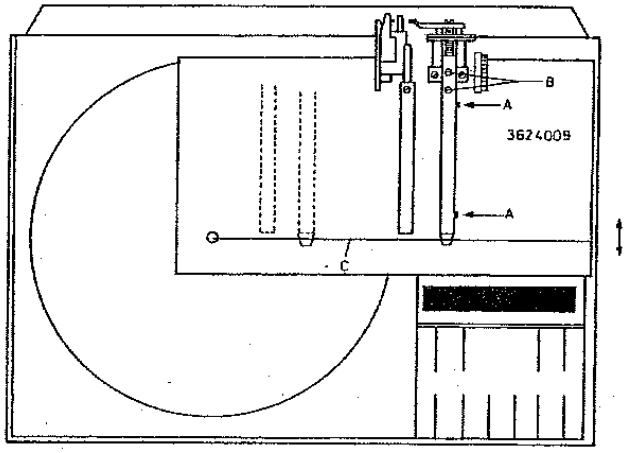


Set stylus force adjustment at "0".

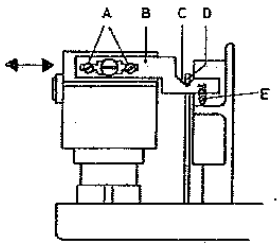
Release the pickup arm from the lifting arm.

Adjust screw A for balance in the system.

Adjustment of pickup arm length and parallelism



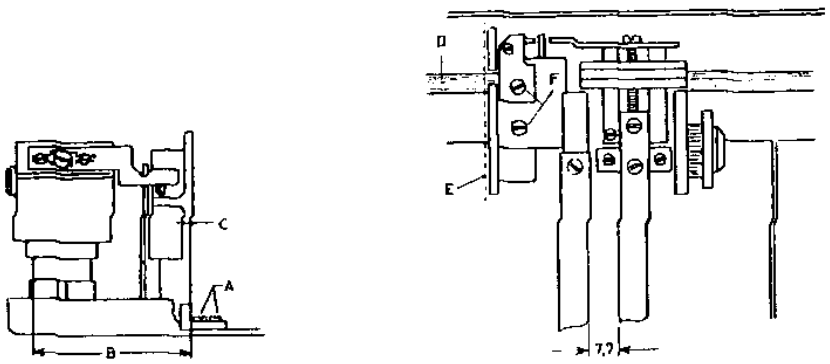
Adjust stylus force to 1 gr.
Take off driving belt for turntable.
Run pickup arm towards the centre.
Place tool 3624009 on Beogram 4002-6000 as shown in the sketch. Run the pickup arm close in towards pins A.
Lower pickup on to tool.
Slide tool back and forth so that the stylus falls into the groove C. Retain the tool in this position.
Raise the pickup and run it in towards the centre.
Lower the pickup in the position shown in the sketch.
If the stylus falls otside the groove C, adjust this deviation to one-half, using screws B.
Run the pickup arm all the way out to the pins A, where the pickup is lowered, and move tool 3624009 so that the stylus is accurately positioned in the groove C.
Raise the pickup arm.



The pickup arm should be adjusted to be parallel with pins A in tool 3624009.
Adjustment is performed by loosening screws A and then sliding the arm B in the direction of the arrow.

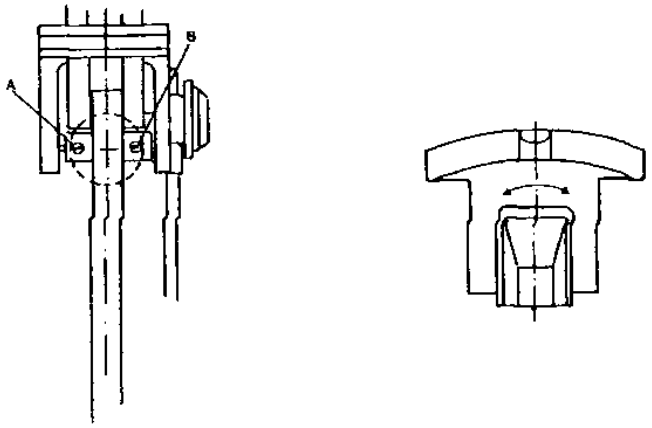
When checking for parallelism, the arm D must be the whole way down in the notch C.
By means of the screw E adjust the pickup arm to be horizontal. Reference: detector arm.
Check pickup arm length if necessary.

Adjustment of detector arm



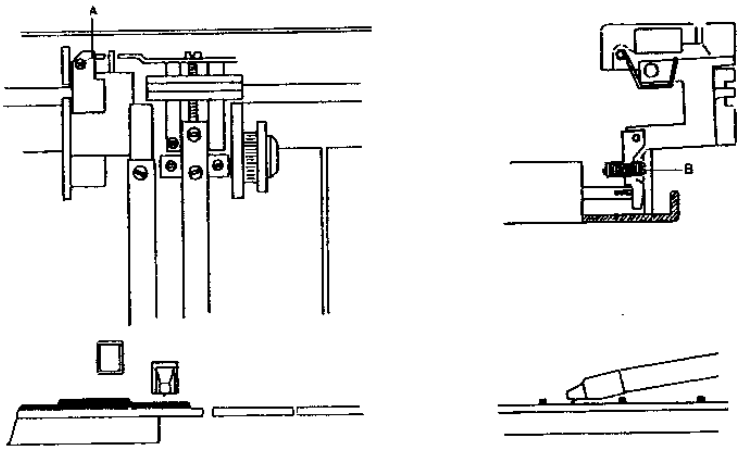
Loosen screws A.
Adjust detector arm holder C so that distance B is 49.4 mm. Make sure that the surface E is perpendicular to the rod D.
Tighten screws A.
With the screws F loosened, adjust the detector arm to be parallel with the pickup arm at a distance of 7.7 mm (the pickup arm must be adjusted for horizontal placement and parallelism).

Turning



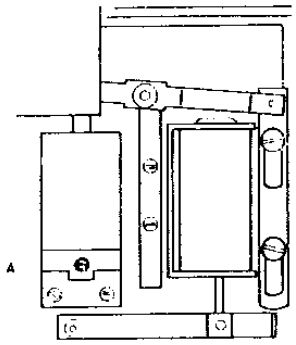
By loosening the screw A and tightening the screw B, or vice versa, adjust the turning of the pickup arm so that its top side is parallel with the rods.
A check can be made by means of a sprit level with the Beogram placed on a horizontal support.

Lower adjustment



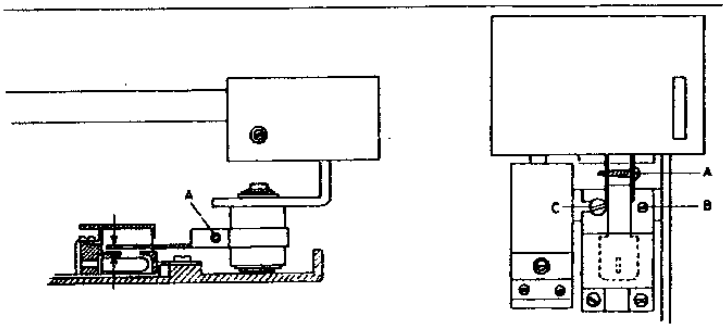
Loosen the screw A.
Adjust the screw B so that the stylus, with the pickup arm in its lowered position, only just touches the turntable between the ribs.
Thereafter, also with the pickup arm in its lowered position, adjust the screw A so that the stylus positively clears the low portion of the turntable ribs (approx. 0.5 mm).

Adjustment of damper cylinder



Adjust the valve A so that the pickup lowers at a uniform rate of speed.
Lower time approx. 1 sec.

Adjustment of diaphragm



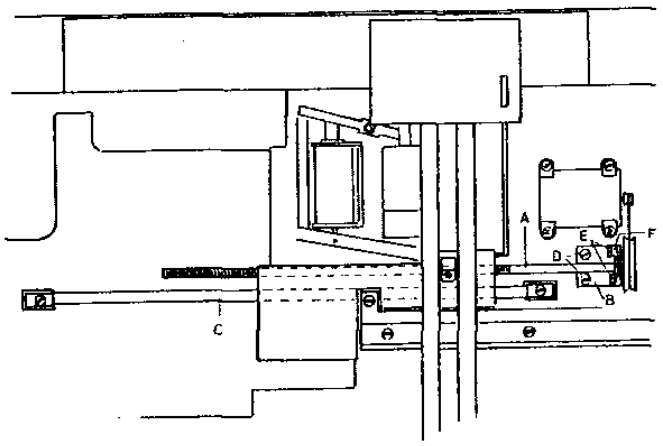
The diaphragm is adjusted by loosening the screw A and turning it on the pivot.
Adjust the diaphragm to be as close to the housing as possible but without actually touching it.
Also adjust the diaphragm so that the diaphragm arm becomes parallel with the pickup arm.
Fine adjustment of the diaphragm is performed with test record 3621001 in cut 5, with the turntable belt taken off.

1 Run arm in above record.
2 Lower pickup.

3 Rotate the turntable manually, checking that the servo regulates the first time after 2 ± 1 revolution and thereafter at each revolution.
4 If the servo does not regulate within 1-3 revolutions, loosen the screw C and adjust eccentric B; thereafter raise the arm and repeat items 2-4.
5 With the adjustment of eccentric B completed, tighten the screw C.

Make sure that the arm has made an inward movement before the pickup lowers.

Adjustment of spindle



Adjust the spindle A so that it is parallel with the rod C both in the vertical and horizontal planes.
The horizontal plane is adjusted by loosening the screws D and turning the bearing holder B.
The vertical plane is adjusted by loosening screws E and turning the bearing F.

Lubrication chart

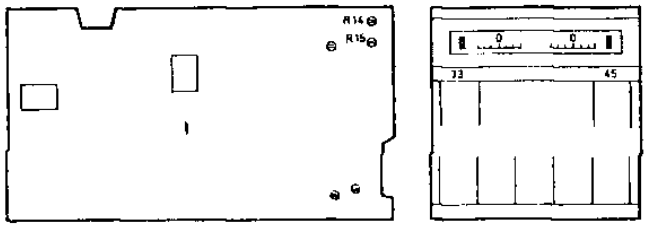
The need for relubrication is negligible.
In the case of overhauls and when replacing mechanical parts the directions below should be followed.

Point of lubrication	Lubricant	Remarks
Turntable bearing	3984008, M4 oil	Apply to shaft point + streak throughout length of shaft
Spindle pos. No. 213	3984216, Rocol MTS 1000. Dilute to oily consistency with 3984221, ESSO NUTO H44/HP32	
Shaft tie-bar No. 137	3984218, Molykote DX paste (white)	Apply to entire surface in thin film
Spindle bearing pos. No. 122	3984218, Molykote DX paste (white)	
Shifter arm pos. No. 198	3984211, Castrol Everyman Oil	Apply to sliding surfaces
Arm pos. No. 190	3984211, Castrol Everyman Oil	Apply at point of rotation
Arm pos. No. 193	3984211, Castrol Everyman Oil	Apply at point of rotation

ELECTRICAL ADJUSTMENTS

To get at the trimmer potentiometers, take off top portion of turntable.

Speed



Set 33 and 45 rpm scales to 0.

Adjust 33 rpm with potentiometer 1R15
Adjust 45 rpm with potentiometer 1R14

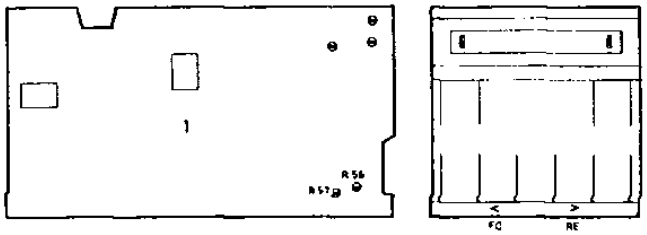
Speed can be checked in more than one way:

1: Stroboscobe disc and lamp connected to the mains.
This check has an inherent uncertainty of approx.
2% since the mains frequency deviates by approx.
±1 Hz at 50 Hz.

2: Stroboscope disc and stroboscope lamp. This check gives an accuracy corresponding to the tolerance of the stroboscope lamp, usually much better than that of the mains frequency.

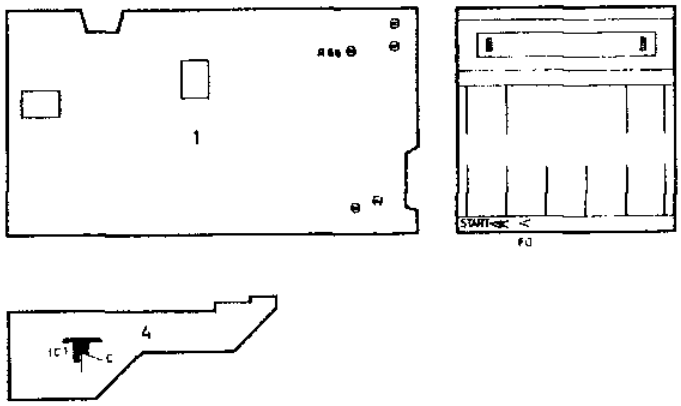
Production adjustment is based on division to 50 Hz from a crystal at 1MHz ±1 Hz, which gives an accuracy of approx. 0.005%.

Slow slide transport



Connect VTVM to servo motor terminals. Depress " " button and adjust, with R156, voltage across motor to 3 V.
Reverse measuring leads to VTVM (across servo motor) and depress ">".
Adjust voltage across motor with 1R57 to 3 V.

Photo darlington



"START≪" Activate.

Move slide towards center of the turntable. When the slide is facing a transparent field on the position marker, stop it by depressing "<".
Connect vacuum-tube voltmeter to collector on 4IC1.
Adjust 1R88 tilvoltage on the collector 4IC1 is 5V.

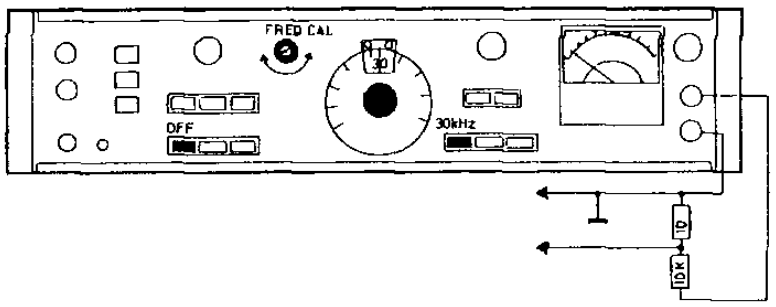
ADJUSTMENT OF CD-4 DEMODULATOR

Instruments

CD-4 generator MSG 213, Meguro
AF VTVM RV 9, B&O
Oscilloscope OS 1000, Advance
D 65, Telequipment

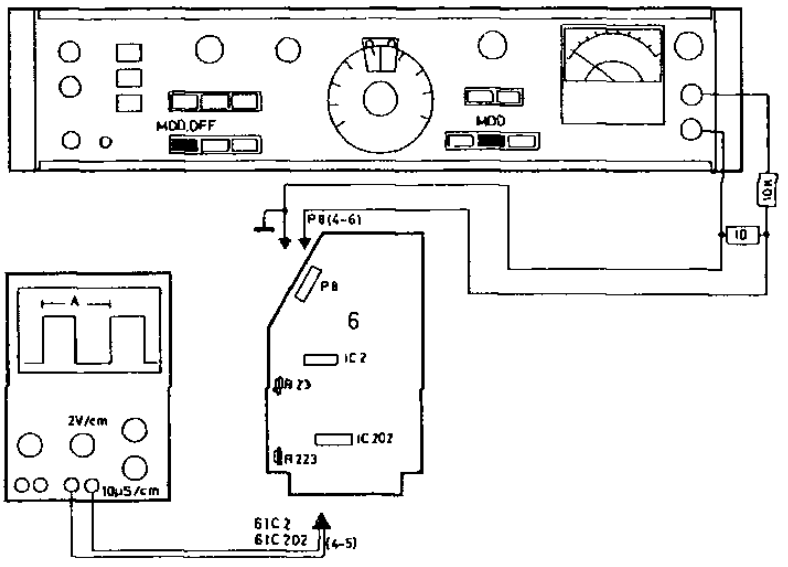
Tone generator TG 7, B&O
Test record: 4DE-205, JVC

CD-4 generator calibration

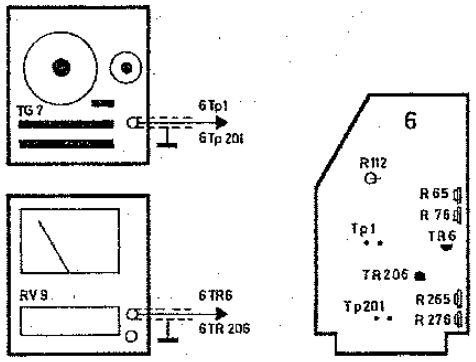


Depress MOD. SELECTOR "OFF".
Depress FREQ. CAL. 30 kHz.
Set FREQUENCY dial to 30 kHz.
Adjust FREQ. CAL. for minimum meter reading. While adjusting, the meter needle will make three dips.
Select the one giving the lowest meter reading.
In order to get a more accurate range of variation the generator output should be loaded as shown in the sketch.
References are for left channel and bracketed references are for right channel.
NOTE: Measuring instruments, generator and demodulator should have power applied to them for not less 15 minutes before attempting adjustment.

VCO



1. Depress MOD. SELECTOR "OFF".
2. Depress "MOD".
3. Connect CD-4 generator to pin 4 of/P8 (Pin 6 of P8).
4. Connect oscilloscope to pins 4-5 of 6IC2 (6IC202).
5. Start Beogram (press "START" and thereafter "<").
6. Read distance A on oscilloscope (one cycle).
7. Open connection between CD-4 generator and P8, and adjust 6R23 (6R223) so that distance A (the frequency) is the same as at point 6.

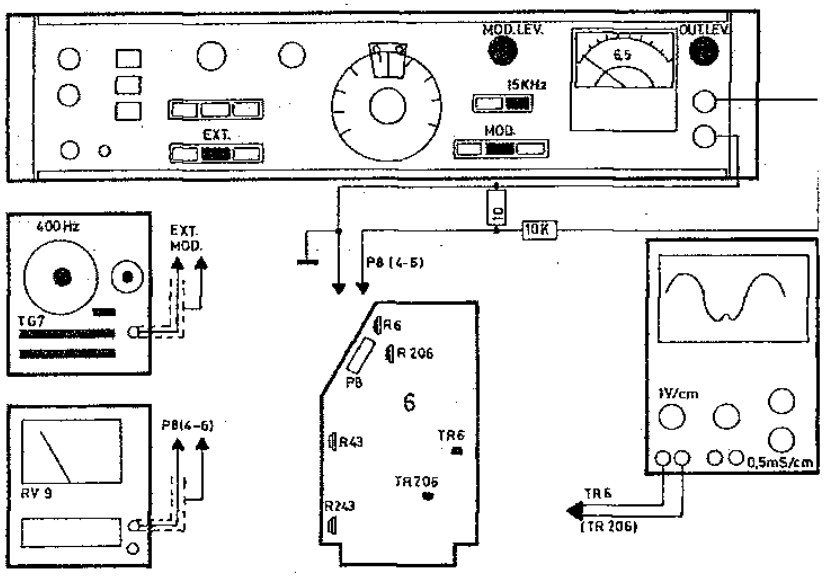


1. Short 6R112.
2. Unsolder shorting strap at 6Tp1 (6Tp201)
3. Connect tone generator to 6Tp1 (6TP201) at 6C22 (6C222).
4. Set tone generator to deliver 10 kHz 4.10 mV.
5. Connect VTVM to collector of 6TR6 (6TR206).
6. Lower pickup arm (press "START", thereafter " ").
7. Adjust 6R76 (6R276) for 1.58 mV at collector of 6TR6 (6TR206).
8. Set tone generator to deliver 400 Hz 23.1 mV.
9. Adjust 6R65 (6R265) for 18.2 mV at collector of 6TR6 (6TR206).
   ANRS Check
   As input and output points again use 6Tp1 (6Tp201) and collector of 6TR6 (6TR206).
10. Set tone generator to deliver 400 Hz 73.2 mV; output should then be 93 mV ± 2.5 dB.
11. Set tone generator to deliver 10 kHz 23.1 mV; output should then be 16 mV ± 2.5 dB.

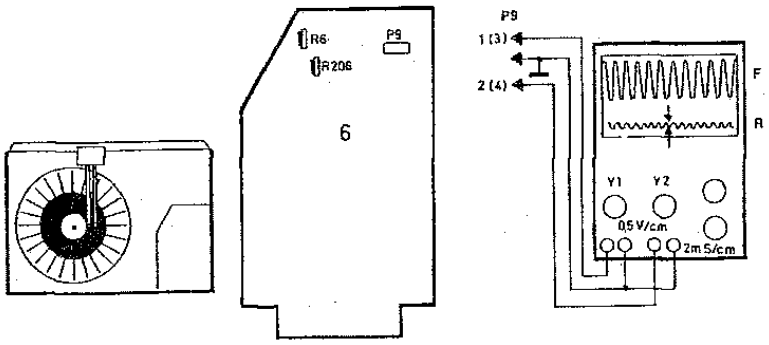
Remove short from across 6R112.
Solder shorting strap at 6Tp1 (6Tp201).

It is important that the above sequence be observed.

Carrier detector



1. Turn 6R11 (6R211) to max. gain (centre pin towards C 6TR1 (6TR201)).
2. Turn 6R6 (6R206) to max. gain (min. resistance).
3. Depress MOD. SELECTOR "EXT".
4. Depress METER RANGE "15 kHz".
5. Depress "MOD."
6. Set tone generator to deliver 400 Hz. Connect tone generator to EXT. MOD. on back of CD-4 generator.
7. Set tone generator output and "MOD. LEVEL" for 6.5 kHz max. frequency swing on meter (0-15 kHz scale).
8. Short pins 4-6 of P8 together and connect CD-4 generator.
9. Set "OUT. LEVEL" to 0.58 mV as measured with AF VTVM at pins 4-5 of P8.
10. Connect oscilloscope to collector of 6TR6 (6TR206).
11. Lower pickup arm (press "START", thereafter "∧∨").
12. Adjust 6R43 (6R243) so that sine-wave curve is only just undistorted.
13. Remove connections from CD-4 generator, and remove shorting strap from between pins 4-6 of P8.

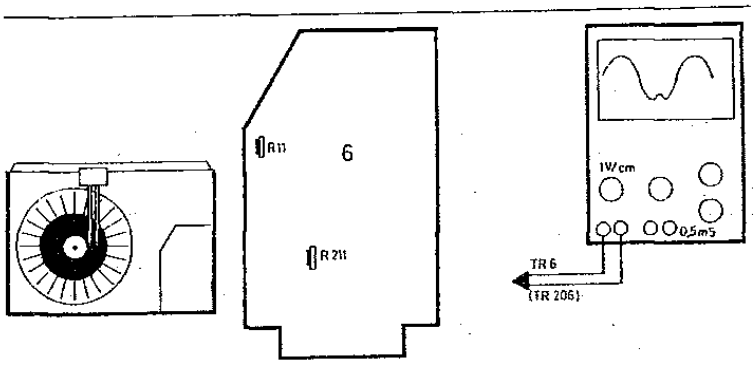


Separation can be measured in more than one way.

1: Using an oscilloscope.
Connect Y1 input from oscilloscope to demodulator output, pin 1 (3) of P9.
Connect Y2 input from oscilloscope to demodulator output, pin 2 (4) of P9.
Play test record, e.g. JVC 4DE-205, section 3, with the MMC 6000 to be employed with the demodulator. Adjust 6R6 (6R206) for min. at Y2 input corresponding to min. in rear channels.

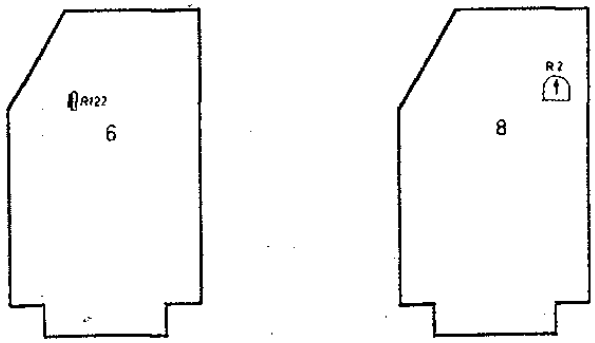
2: Using a 4-channel amplifier.
Switch off front channels.
Play test record JVC 4DE-205 with the MMC 6000 to be employed with the demodulator.
Adjust 6R6 (6R206) for min. sound in rear channels.

Fine Adjustment Carrier Wave Detector



Silent Circuit

Connect oscilloscope to collector 6TR6 (6TR206).
Play test disc JVC 4DE - 205 section 2.
Adjust 6R11 (6R211) till sine wave is just undistorted.
Note: In case of replacement of pickup, channel separation and carrier wave detector must be adjusted.



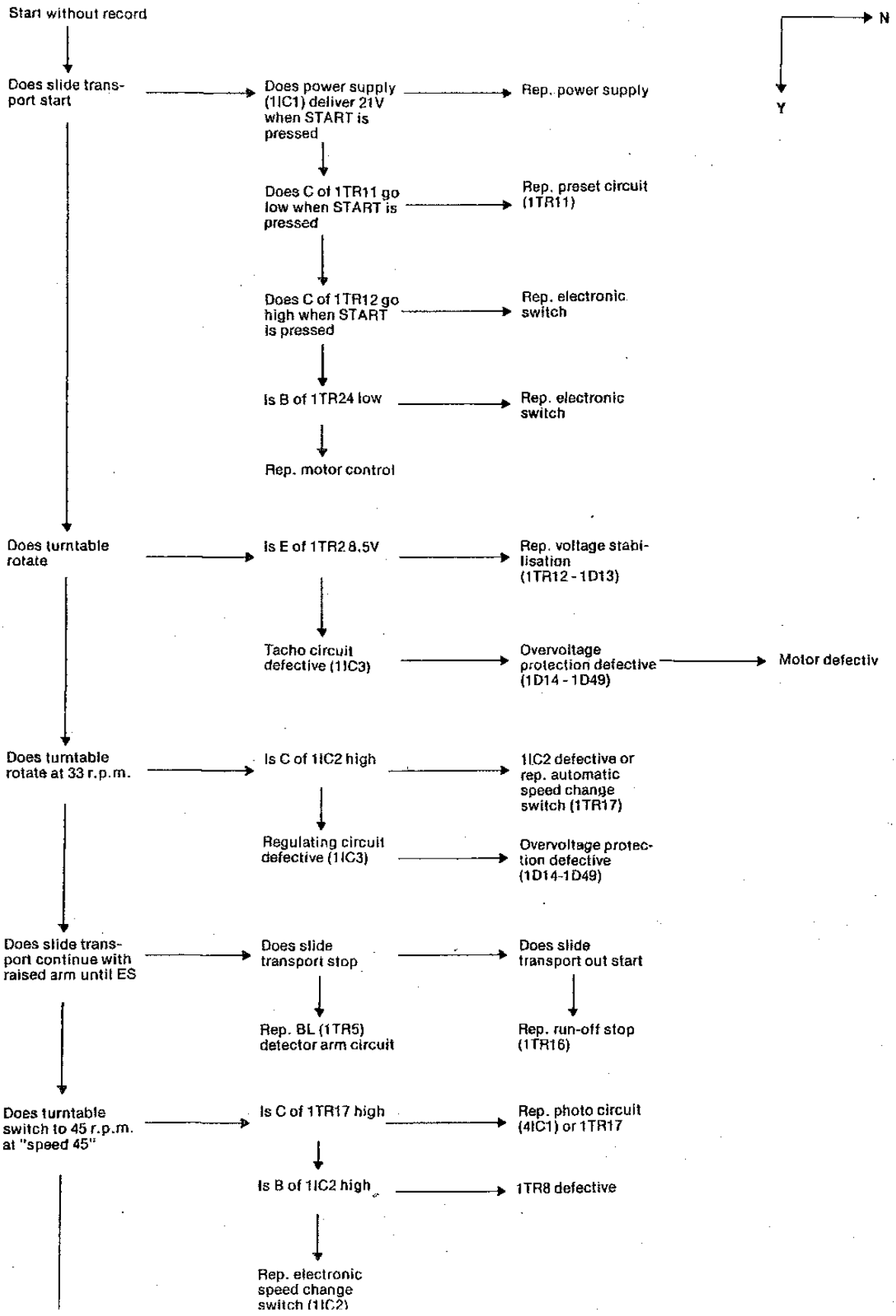
Beogram 6000

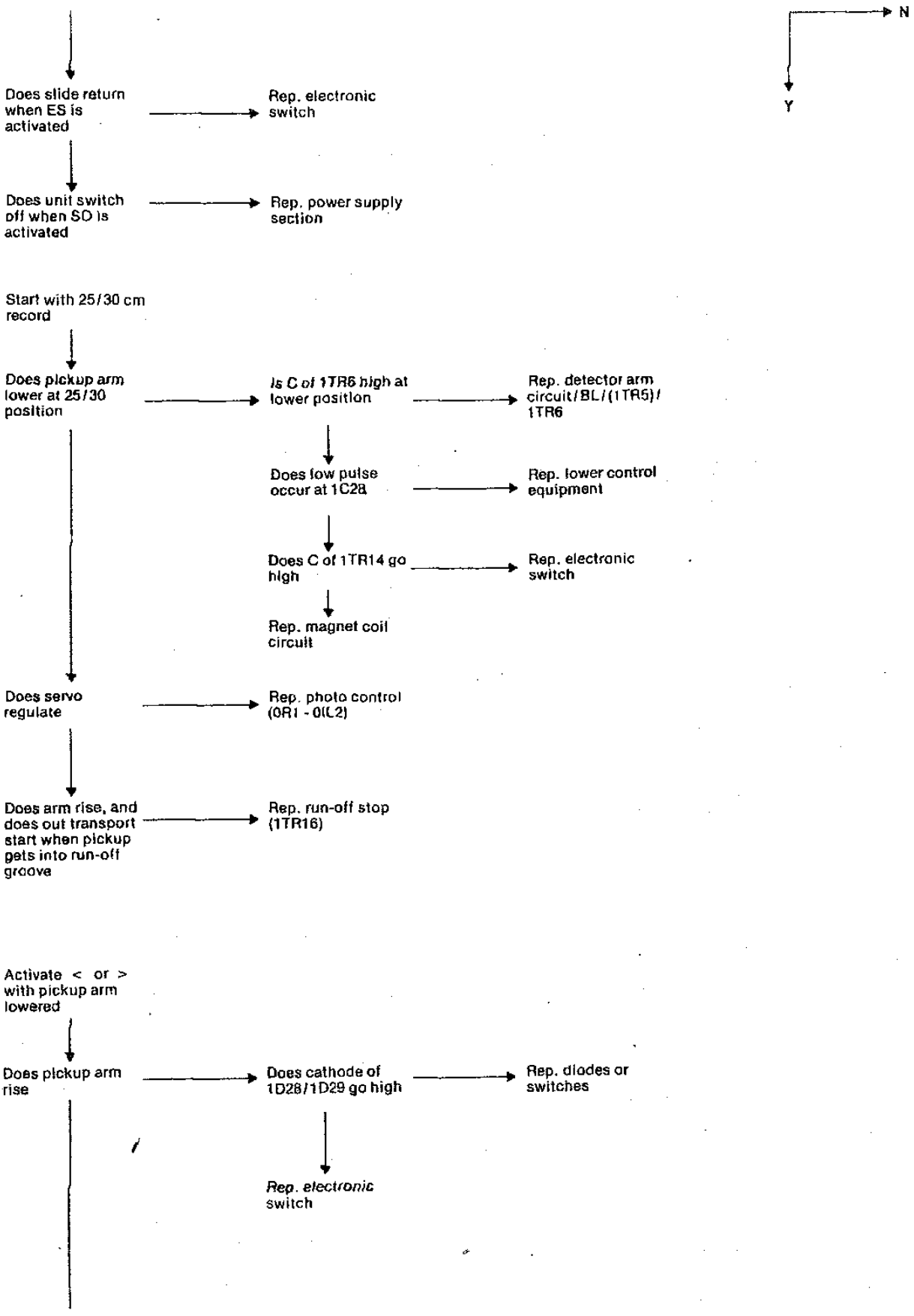
Adjust 6R122 so that pickup signal is allowed to pass from the pickup cartridge between 1/2 and 1 revolution of the record after the pickup has been lowered (33 rpm).

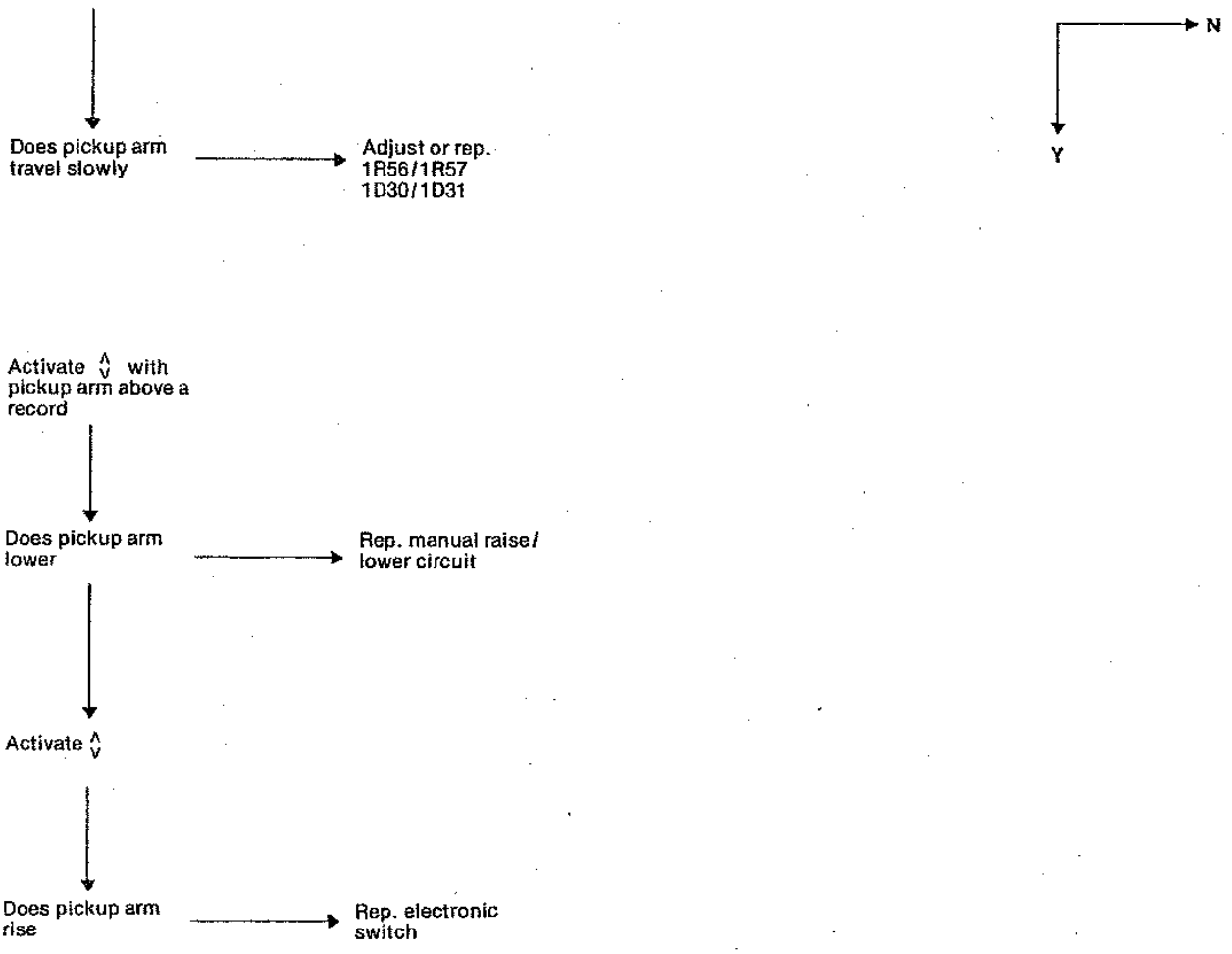
Beogram 4002

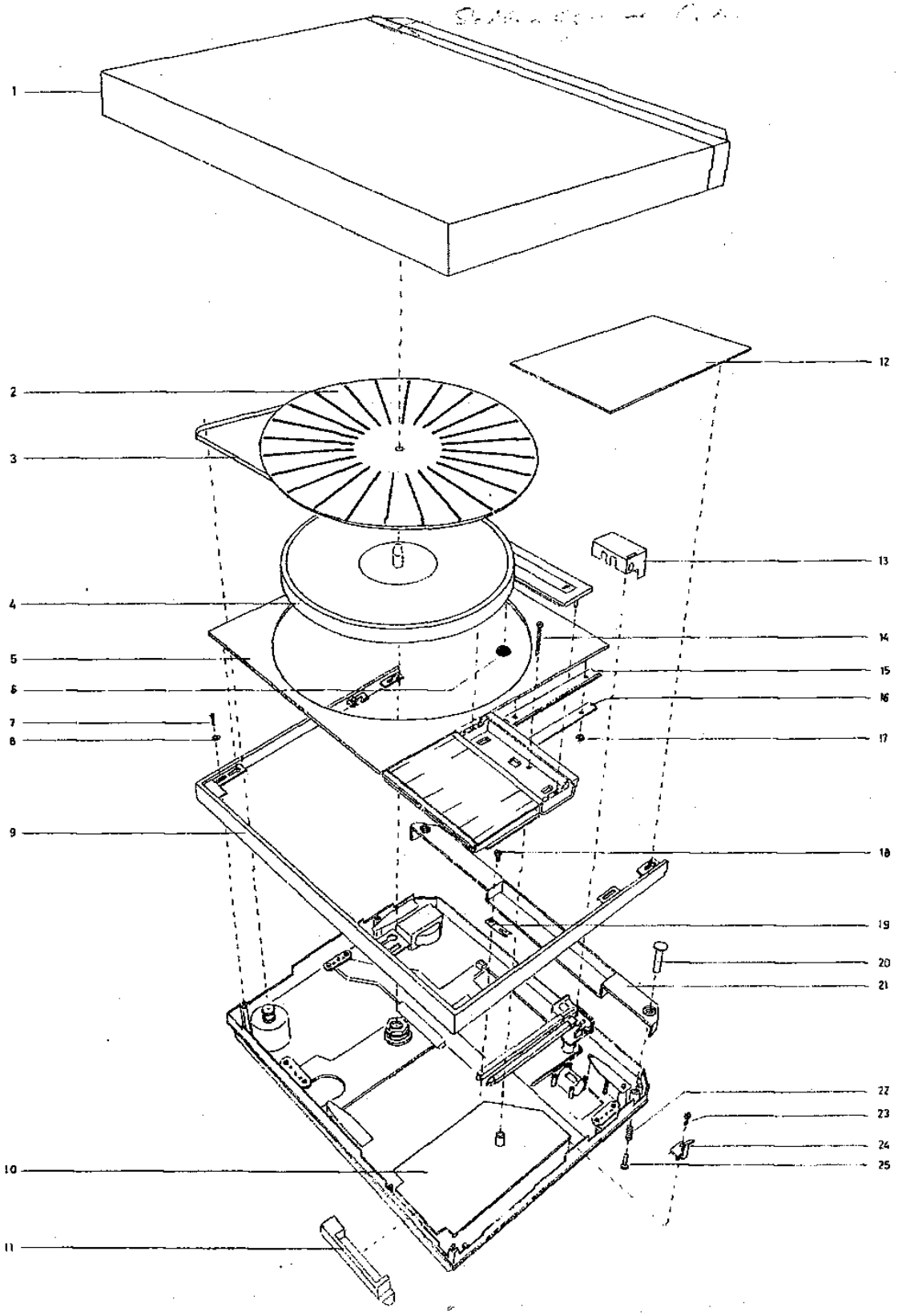
Adjust 8R2 as described for 6R122 above.

FAULT-FINDING


Start without record
Does slide transport start
N
Y
Does power supply (1IC1) deliver 21V when START is pressed
Rep. power supply
Does C of 1TR11 go low when START is pressed
Rep. preset circuit (1TR11)
Does C of 1TR12 go high when START is pressed
Rep. electronic switch
Is B of 1TR24 low
Rep. electronic switch
Rep. motor control
Does turntable rotate
Is E of 1TR2 8.5V
Rep. voltage stabilisation (1TR12 - 1D13)
Tacho circuit defective (1IC3)
Overvoltage protection defective (1D14 - 1D49)
Motor defectiv
Does turntable rotate at 33 r.p.m.
Is C of 1IC2 high
1IC2 defective or rep. automatic speed change switch (1TR17)
Regulating circuit defective (1IC3)
Overvoltage protection defective (1D14-1D49)
Does slide transport continue with raised arm until ES
Does slide transport stop
Does slide transport out start
Rep. BL (1TR5) detector arm circuit
Rep. run-off stop (1TR16)
Does turntable switch to 45 r.p.m. at "speed 45"
Is C of 1TR17 high
Rep. photo circuit (4IC1) or 1TR17
Is B of 1IC2 high
1TR8 defective
Rep. electronic speed change switch (1IC2)


N
Y
Does slide return when ES is activated
Rep. electronic switch
Does unit switch off when SD is activated
Rep. power supply section
Start with 25/30 cm record
Does pickup arm lower at 25/30 position
Is C of 1TR6 high at lower position
Rep. detector arm circuit/BL/(1TR5)/1TR6
Does low pulse occur at 1C28
Rep. lower control equipment
Does C of 1TR14 go high
Rep. electronic switch
Rep. magnet coil circuit
Does servo regulate
Rep. photo control (0R1 - 0(L2)
Does arm rise, and does out transport start when pickup gets into run-off groove
Rep. run-off stop (1TR16)
Activate < or > with pickup arm lowered
Does pickup arm rise
Does cathode of 1D28/1D29 go high
Rep. diodes or switches
Rep. electronic switch


Does pickup arm travel slowly
Adjust or rep. 1R56/1R57 1D30/1D31
N
Y
Activate ^ v with pickup arm above a record
Does pickup arm lower
Rep. manual raise/ lower circuit
Activate ^ v
Does pickup arm rise
Rep. electronic switch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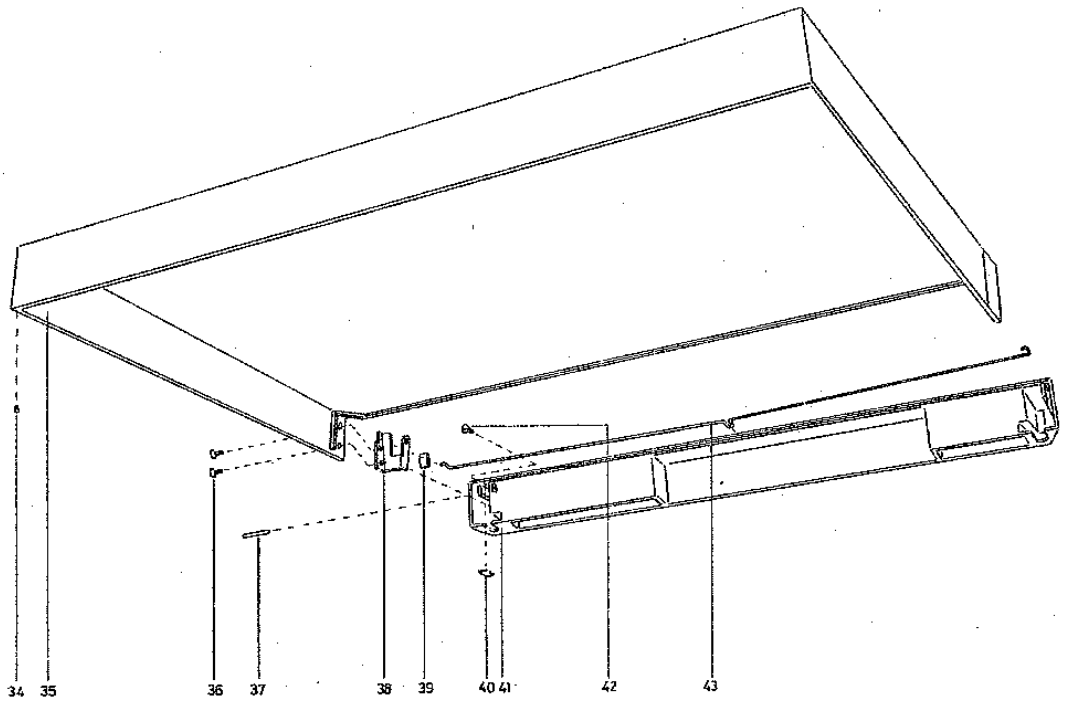
1	3164184	Dust cover Beogram 4002		3412054	Cabinet, oak	18	2042205	Screw AM 4 x 6 DIN 84
	3164183	Dust cover Beogram 6000		3412055	Cabinet, white	19	2816083	Spring
2	2726084	Turntable		8005014	PC-board, for 4002	20	2994012	Bushing
3	2732018	Driving-belt		8005015	PC-board, for 6000	21	3452242	Back piece 4002, 5511
4	2726089	Turntable	11	3152159	Holder		3452243	Back piece 4002, 5512
5	3458154	Top plate	12	3458114	Top plate		3452244	Back piece 4002, 5513
6	3912037	Felt washer	13	3164142	Cover		3452245	Back piece 4002, 5514
7	2013002	Screw 2.9 c 6.5 DIN 7982	14	2038237	Screw AM 3 x 30 DIN 84		3452246	Back piece 6000, 5515
8	2803004	Guide washer	15	2816085	Spring		3452268	Back piece 4002-6000 without print
9	3412051	Cabinet, teak	16	3014023	Guide plate	22	2810066	Spring
	3412053	Cabinet, rosewood	17	2380093	Nut, nylon	23	2013066	Screw 2.84 x 12.7



24	3152135	Lead holder		2560040	Decorative list Beogram 6000	39	3015030	Guide piece
25	2042216	Screw AM 4 x 16 DIN 84	36	2038055	Screw AM 3 x 6 DIN 963 black	40	3010011	Stop for lid
34	3010007	Stop	37	2830014	Bearing needle	41	3452145	Back piece
35	3164190	Lid	38	3030023	Hinge, left	42	2038050	Screw AM 3 x 4 DIN 63
	2560039	Decorative list Beogram 4002		3030022	Hinge, right	43	2819062	Spring

1	3164184	Dust cover Beogram 4002		3412054	Cabinet, oak	18	2042205	Screw AM 4 x 6 DIN 84
	3164183	Dust cover Beogram 6000		3412055	Cabinet, white	19	2816083	Spring
2	2726084	Turntable		8005014	PC-board, for 4002	20	2994012	Bushing
3	2732018	Driving-belt		8005015	PC-board, for 6000	21	3452242	Back piece 4002, 5511
4	2726089	Turntable	11	3152159	Holder		3452243	Back piece 4002, 5512
5	3458154	Top plate	12	3458114	Top plate		3452244	Back piece 4002, 5513
6	3912037	Felt washer	13	3164142	Cover		3452245	Back piece 4002, 5514
7	2013002	Screw 2.9 c 6.5 DIN 7982	14	2038237	Screw AM 3 x 30 DIN 84		3452246	Back piece 6000, 5515
8	2803004	Guide washer	15	2816085	Spring		3452268	Back piece 4002-6000 without print
9	3412051	Cabinet, teak	16	3014023	Guide plate	22	2810066	Spring
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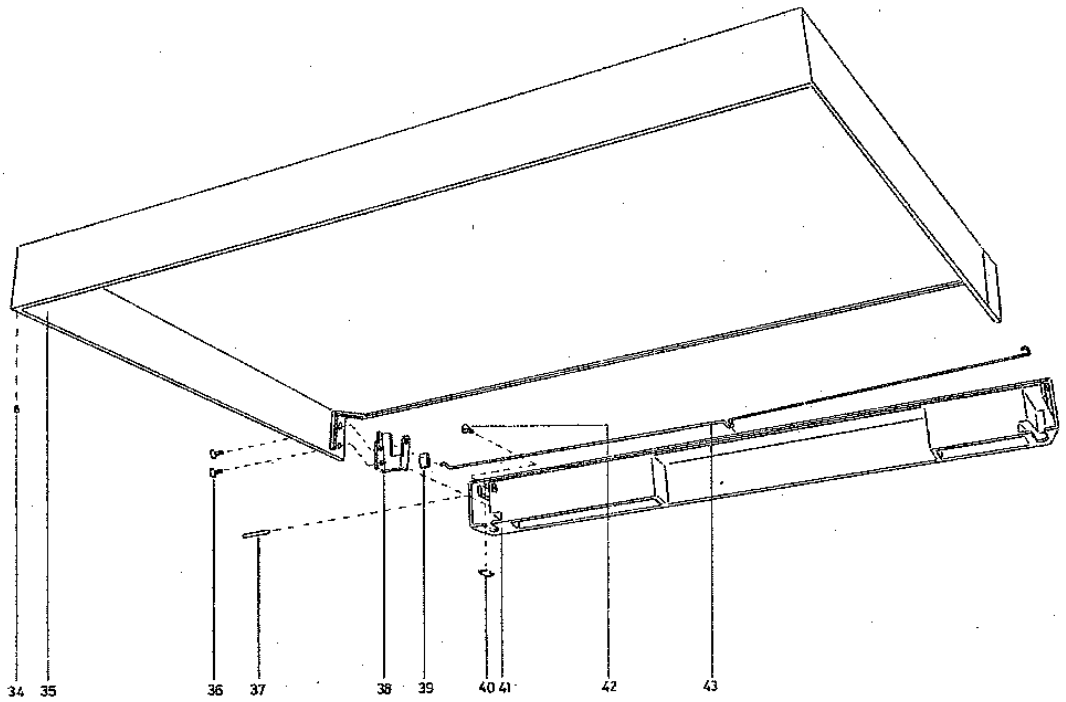
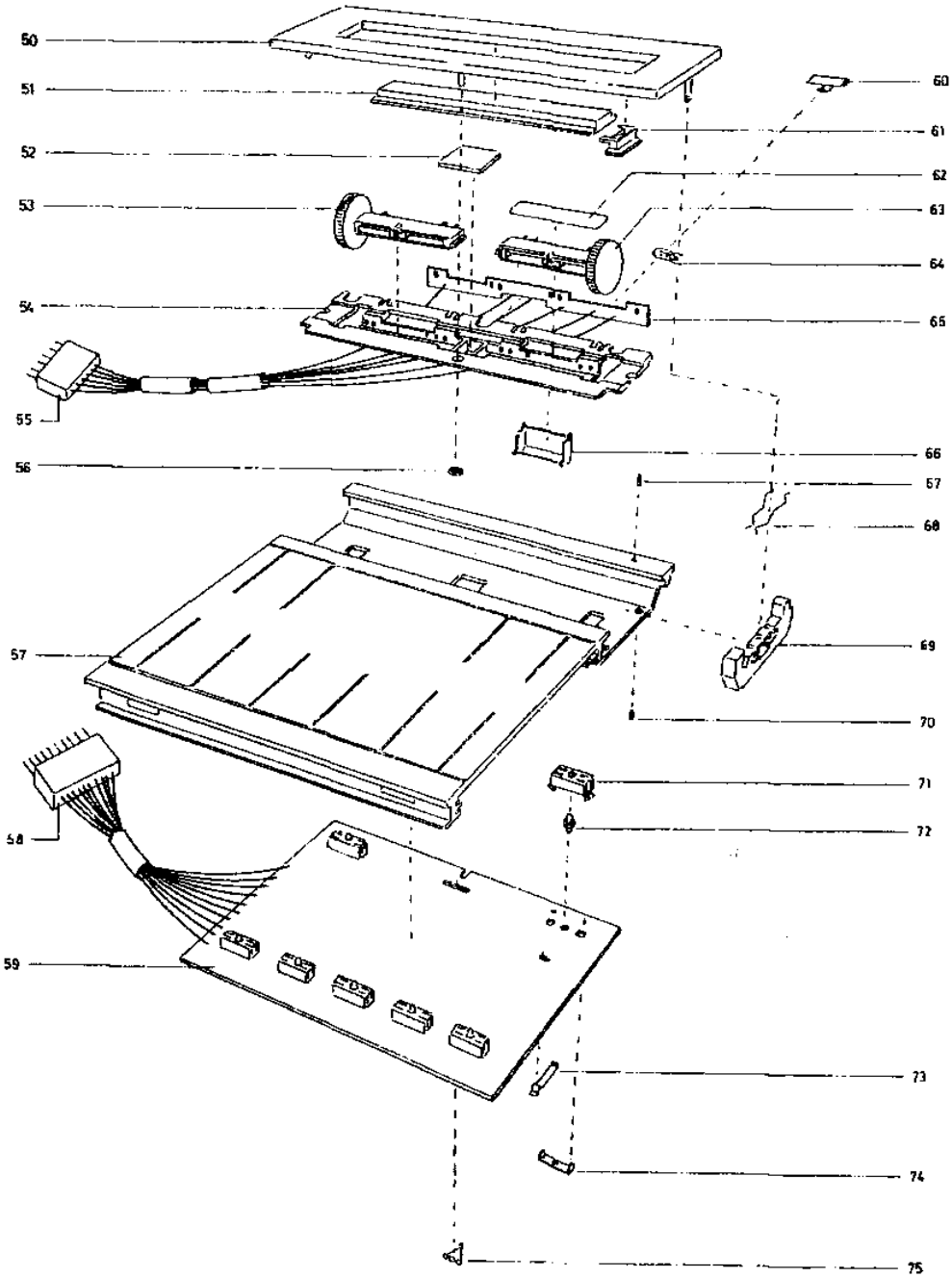
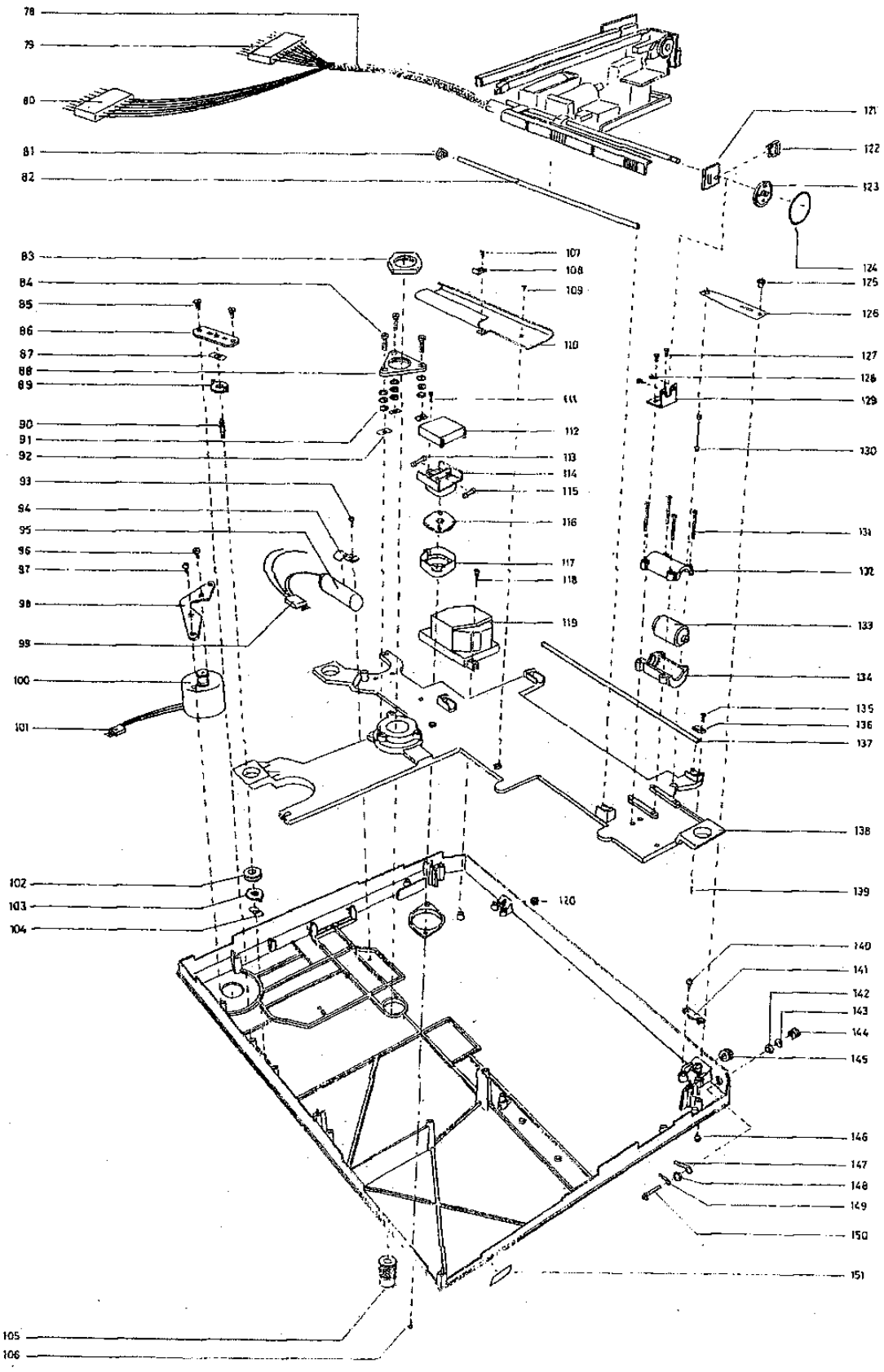


24	3152135	Lead holder		2560040	Decorative list Beogram 6000	39	3015030	Guide piece
25	2042216	Screw AM 4 x 16 DIN 84	36	2038055	Screw AM 3 x 6 DIN 963 black	40	3010011	Stop for lid
34	3010007	Stop	37	2830014	Bearing needle	41	3452145	Back piece
35	3164190	Lid	38	3030023	Hinge, left	42	2038050	Screw AM 3 x 4 DIN 63
	2560039	Decorative list Beogram 4002		3030022	Hinge, right	43	2819062	Spring



50	3458121	Top plate	58	7220052	Housing without pin 10 pol.	67	2361018	Locking pin
51	3199046	Dial		7500076	Contact pin	68	2819096	Spring
52	3164179	Cover	59	8005018	PC-board	69	3152129	Holder
53	5300090	Potentiometer, left	60	3358116	Heat sink	70	2072701	Threaded pin M3 x 4 DIN 438
54	3131085	Housing for potentiometer	61	3199047	End piece	71	3152068	Holder
55	7220057	*Housing without pins 6 pol.*	62	3180621	*Sticker*	72	2992059	Contact pin
	7500076	Contact pin		5300091	Potentiometer	73	7500075	Contact spring
56	2395034	Spire		8238230152	Lamp 24 V 40 mA	74	7500050	Contact bridge
57	8055016	Chassis, complete 4002	65	6140376	PC-board	75	2816111	Locking spring
	8055017	Chassis, complete 6000	66	3300044	Screen			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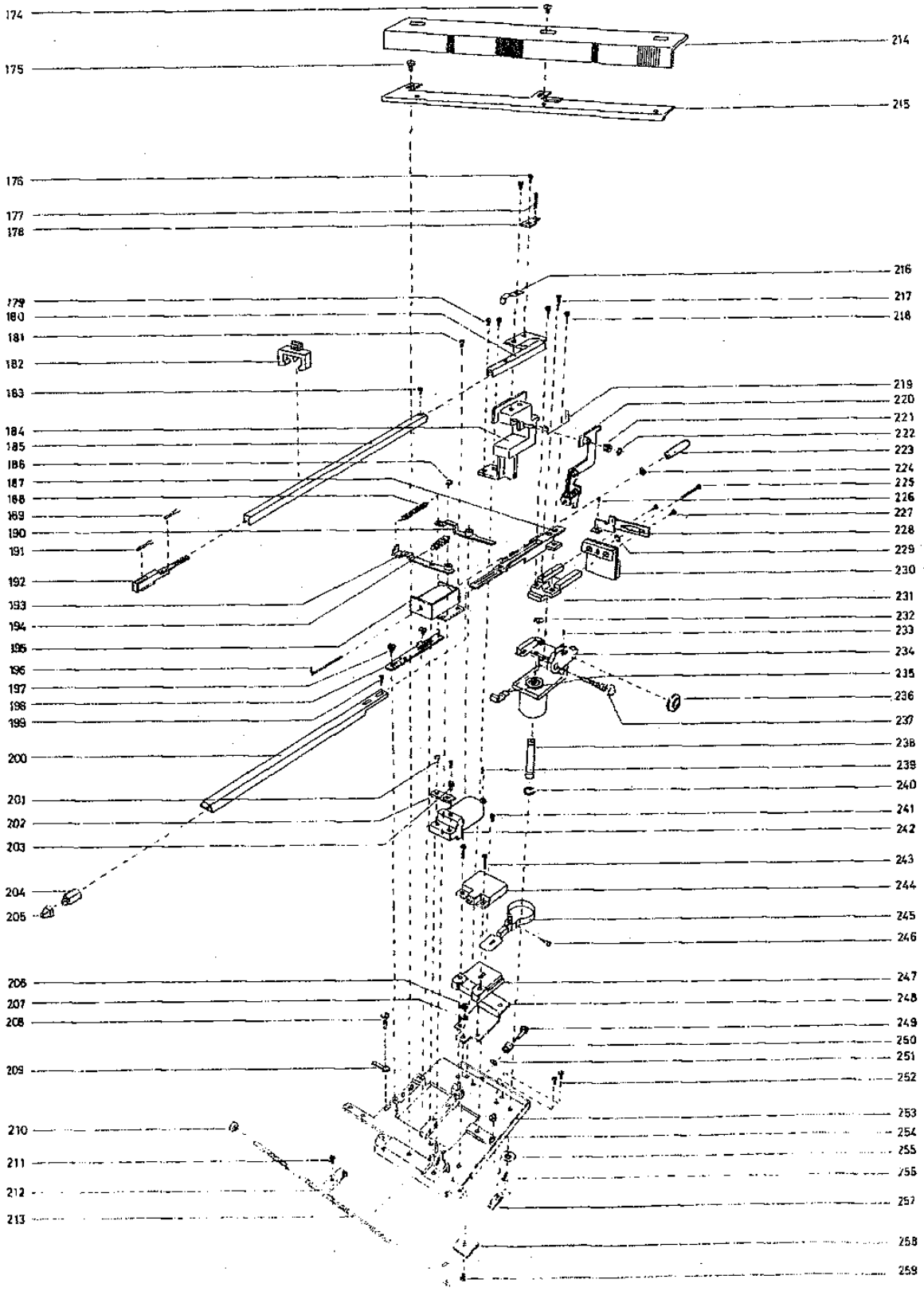
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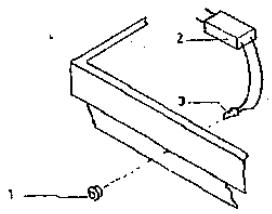
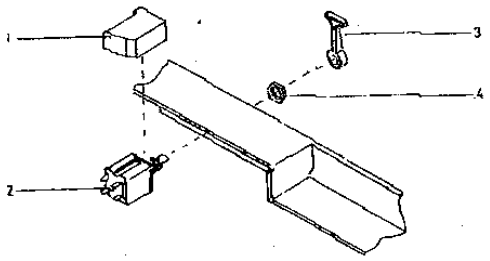
174	2038952	Screw 3 x 4 DIN 963
175	2038206	Screw 3 x 4 DIN 84
176	2038247	Screw AM 3 x 6 mm DIN 84
177	2072918	Threaded pin M3 x 15 mm
178	3151086	Holder
179	2038247	Screw AM 3 x 6 mm DIN 84
	2625002	Tooth-lock washer
	7530008	Solder tag
180	3152076	Holder
181	2032208	Screw AM 3 x 5 mm DIN 84
182	3391407	Transit protection
183	2034236	Screw AM 2 x 3 mm DIN 84
184	3152145	Holder for cover
	3947421	Tape
	2645025	Plate
185	3917608	Slave arm
186	2390004	Circlip UG 3 x 0.6
187	3152179	Holder for pickup arm complete
188	2810083	Spring
189	8760002	Foto cell
190	2853025	Arm
191	8230047	Lamp 6V
192	3375026	Optics
193	2853045	Arm
194	2810087	Spring
195	6810006	Magnet coil
196	2850047	Press bar
197	2038948	Screw
198	2852035	Change lever
199	2034236	Screw AM 2 x 3 mm DIN 84
200	2850077	Pickup arm
201	2038216	Screw AM 3 x 10 mm DIN 84
202	2641075	Clamp
203	2072911	Adjustment screw
204	8954410	Pickup MMC 4000
	8954400	Pickup MMC 6000
	3624008	Service-kit for pickup
205	3302230	Cap for pickup
206	2038948	Screw
207	2624021	Washer
208	2038208	Screw AM 3 x 5 DIN 84
209	7530023	Solder tag
210	2389031	Bearing nut
211	2038208	Screw AM 3 x 5 DIN 84
212	3152074	Holder
213	2993028	Spindle
214	3199049	Dial
215	3151139	Holder for dial
216	2816216	Spring
217	2034220	Screw AM 2 x 12 DIN 84
218	2034211	Screw AM 2 x 6 DIN 84
219	2819061	Spring
220	2851083	Lifting arm complete
	2812065	Spring
	2034219	Screw AM 2 x 10 DIN 84
221	2812041	Spring
222	2390004	Circlip
223	2894029	Armature
224	2802023	Washer
225	2038233	Screw AM 3 x 20 DIN 84
226	2072701	Threaded pin M3 x 4 mm
227	2034231	Screw AM 2 x 4 DIN 84
228	2854023	Arm
229	2390001	Circlip
230	3342030	Counterweight
231	3152162	Holder for counterweight
232	2390046	Circlip
233	2070400	Threaded pin M2 x 3 mm
234	3150032	Bearing holder
	2900003	Ball bearing
	2622168	Washer, brass
	2812036	Spring
	2390047	Circlip
235	2548109	Bracket
236	2700008	Adjustment bushing
237	2834041	Shaft collected
238	2831025	Shaft
239	2365085	Valve
240	2390046	Circlip
241	2038206	Screw AM 3 x 4 DIN 84
242	3131123	Damper cylinder
243	2038222	Screw AM 3 x 14 DIN 84
244	3164196	Housing with lamp
245	2854059	Diaphragmarm
246	2013203	Screw 2.84 x 12.7 ART 4261
247	3131052	Housing for foto resistor
248	5210004	Foto resistor
249	3151085	Holder
250	2038946	Screw
251	2794029	Roller
252	2622041	Washer
253	2038208	Screw AM 3 x 5 DIN 84
254	2798003	Excentrik
255	3114068	Chassis, slide
256	2624028	Thrust washer
257	2390046	Circlip
258	2510086	Bracket
259	6140417	PC-board
	2038206	Screw AM 3 x 4 DIN 84

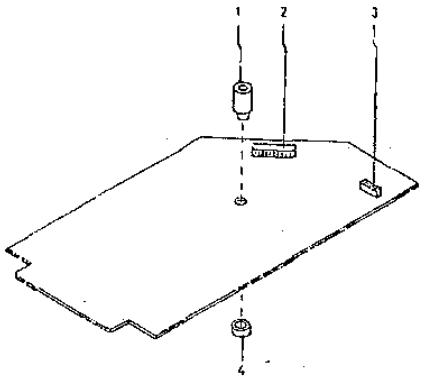




1	3152182	Bushing
2	7220037	Housing without pins 3 pol.
	7500076	Contact pin
3	6100195	Diode

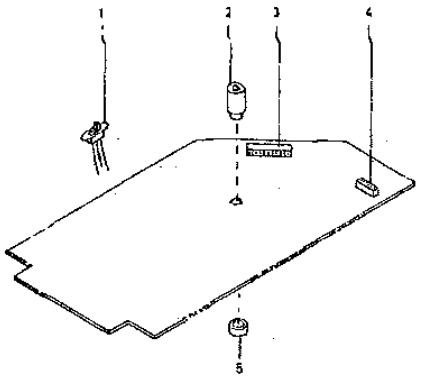
1	3300053	Screen
2	7450018	Mains switch
3	2777033	Arm for mains switch
4	1180047	Nut

PARTS LIST FOR PC-BOARD 8005014 (MEC.)



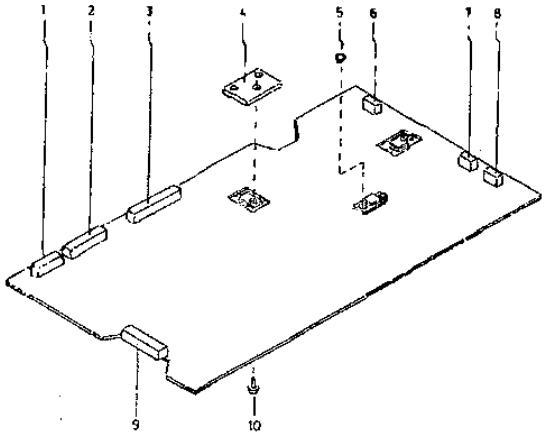
1	2938093	Bushing, support tube
2	7210091	Socket 9 pol.
3	7210026	Socket 6 pol.
4	2938092	Bushing for support tube

PARTS LIST FOR PC-BOARD 8005015 (MEC.)



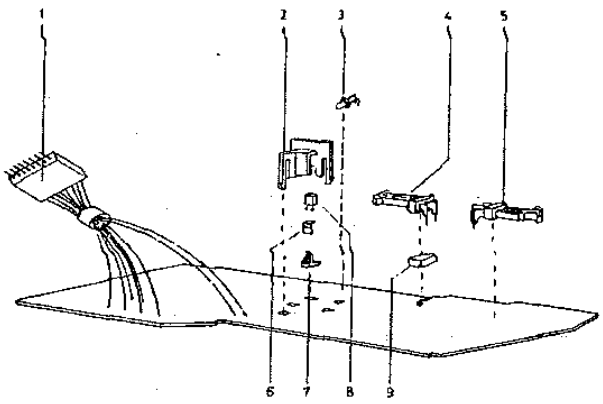
1	7402042	Switch
2	2938093	Bushing, support tube
3	7210091	Socket 9 pol.
4	7210026	Socket 6 pol.
5	2938092	Bushing for support tube

PARTS LIST FOR PC-BOARD 8005016 (MEC.)



1	7210105	Socket 6 pol.
2	7210065	Socket 8 pol.
3	7210106	Socket 11 pol.
4	3558109	Heat sink for transistor
5	2365105	Valve for transistor
6	7210104	Socket 4 pol.
7	7210103	Socket 3 pol.
8	7210103	Socket 3 pol.
9	7210097	Socket 10 pol.
10	2933202	Screw for transistor

PARTS LIST FOR PC-BOARD 8005017 (MEC.)

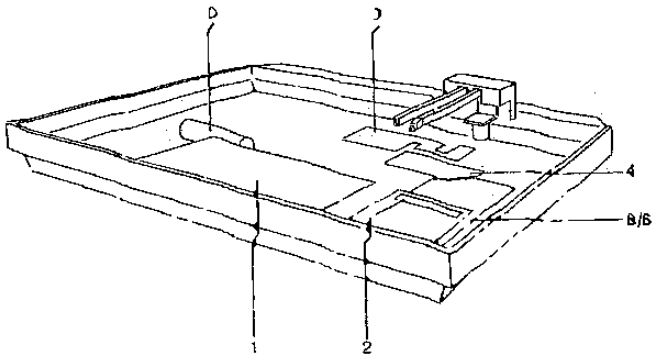


1	7220051	Housing 8 pol.
	7500076	Contact pin
2	3131099	Housing
3	8300229	Light diode
4	7400115	Microswitch
5	7400115	Microswitch
6	2816130	Leaf spring
7	3454170	Bottom piece
	3947518	Tape
8	8340084	Transistor
9	3103077	Foot

NOT SHOWN PARTS

6271048	Mains lead
6270184	Pickup lead with 5 pol. DIN socket
6273751	Lead black with housing
7210057	Housing 6 pol.
7500076	Contact pin
6273724	Frame lead for S513
3391384	Outer carton
3391385	Top/bottom insert
3397157	Foam packing - lid insert
3397158	Foam packing left
3397159	Foam packing right
3535052	Instruction diagram S511-S512
3535053	Instruction diagram S513
3535054	Instruction diagram S514-S515

ELECTRICAL PARTS LIST



8DD5D16 PC 1

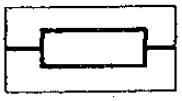
1R1	5002028	2K2 Ohms 10% 1W
1R2	5002026	1K5 Ohms 10% 1W
1R3	5010048	4K7 Ohms 5% 1/8W
1R4	5010061	56 KOhms 5% 1/8W
1R5	5010092	220 Ohms 5% 1/8W
1R6	5010091	82 KOhms 5% 1/8W
1R7	5010135	18 KOhms 5% 1/8W
1R8	5001038	4K7 Ohms 10% 1/2W
1R9	5010072	180 KOhms 5% 1/8W
1R10	5010091	82 KOhms 5% 1/8W
1R11	5010071	560 KOhms 5% 1/8W
1R12	5001021	330 Ohms 10% 1/2W
1R13	5100198	10 Ohms 10% 4W TE
1R14	5370058	5 KOhms 20% LIN.
1R15	5370058	5 KOhms 20% LIN.
1R16	5010052	680 Ohms 5% 1/8W
1R17	5010059	10 KOhms 5% 1/8W
1R18	5010060	39 KOhms 5% 1/8W
1R19	5010045	47 KOhms 5% 1/8W
1R20	5010091	82 KOhms 5% 1/8W
1R21	5010000	270 Ohms 5% 1/8W
1R23	5010068	820 Ohms 5% 1/8W
1R24	5010049	100 KOhms 5% 1/8W
1R25	5010117	330 KOhms 5% 1/8W
1R26	5010054	1 MOhms 5% 1/8W
1R27	5010053	15 KOhms 5% 1/8W
1R28	5010057	15 KOhms 5% 1/8W
1R29	5010053	15 KOhms 5% 1/8W
1R30	5010045	47 KOhms 5% 1/8W
1R31	5010154	8K2 Ohms 5% 1/8W
1R32	5010049	100 KOhms 5% 1/8W
1R33	5010072	180 KOhms 5% 1/8W
1R34	5010054	1 MOhms 5% 1/8W
1R35	5010076	3K3 Ohms 5% 1/8W
1R36	5002018	270 Ohms 10% 1W
1R37	5010071	560 KOhms 5% 1/8W
1R38	5010066	1K8 Ohms 5% 1/8W
1R39	5010049	100 KOhms 5% 1/8W
1R40	5001085	22 MOhms 10% 1/2W
1R41	5010065	100 Ohms 5% 1/8W
1R42	5010049	100 KOhms 5% 1/8W
1R43	5010054	1 MOhms 5% 1/8W
1R44	5010117	330 KOhms 5% 1/8W
1R45	5010054	1 MOhms 5% 1/8W
1R46	5010117	330 KOhms 5% 1/8W
1R47	5010065	100 Ohms 5% 1/8W
1R48	5010049	100 KOhms 5% 1/8W
1R49	5010040	1 KOhms 5% 1/8W
1R50	5010059	10 KOhms 5% 1/8W
1R51	5010049	100 KOhms 5% 1/8W
1R52	5010298	1K7 Ohms 5% 1/8W
1R53	5010154	8K2 Ohms 5% 1/8W
1R54	5010048	22 Ohms 5% 1/8W
1R55	5010042	12 KOhms 5% 1/8W
1R56	5370068	25 KOhms 20% 0,1 W LIN.
1R57	5370068	25 KOhms 20% 0,1 W LIN.
1R58	5010045	47 KOhms 5% 1/8W
1R61	5010059	10 KOhms 5% 1/8W
1R62	5010083	270 KOhms 5% 1/8W
1R63	5010071	560 KOhms 5% 1/8W
1R64	5010059	10 KOhms 5% 1/8W
1R65	5010117	330 KOhms 5% 1/8W
1R66	5010049	100 KOhms 5% 1/8W
1R67	5010059	10 KOhms 5% 1/8W
1R68	5010072	180 KOhms 5% 1/8W
1R69	5010072	180 KOhms 5% 1/8W
1R70	5010072	180 KOhms 5% 1/8W
1R71	5010072	180 KOhms 5% 1/8W
1R72	5010072	180 KOhms 5% 1/8W
1R73	5010077	680 KOhms 5% 1/8W
1R74	5010071	560 KOhms 5% 1/8W
1R75	5010071	560 KOhms 5% 1/8W
1R76	5010071	560 KOhms 5% 1/8W
1R77	5010071	560 KOhms 5% 1/8W
1R78	5010072	180 KOhms 5% 1/8W
1R79	5010072	180 KOhms 5% 1/8W
1R80	5010079	22 KOhms 5% 1/8W
1R81	5010091	82 KOhms 5% 1/8W
1R82	5010054	1 MOhms 5% 1/8W
1R83	5010020	220 Ohms 5% 1/8W
1R84	5010135	18 KOhms 5% 1/8W
1R85	5010048	4K7 Ohms 5% 1/8W
1R86	5010048	4K7 Ohms 5% 1/8W
1R87	5002024	1 KOhms 10% 1W
1R88	5370068	25 KOhms 20% 0,1 W LIN.
1R89	5010092	220 Ohms 5% 1/8W
1R90	5010049	100 KOhms 5% 1/8W
1R91	5010049	100 KOhms 5% 1/8W
1R92	5010135	18 KOhms 5% 1/8W
1R93	5010045	47 KOhms 5% 1/8W
1R94	5010059	10 KOhms 5% 1/8W

1C1	4200169	0,1 µF 35V TANT.
1C2	4200192	22µF 63V
1C3	4130142	220 nF 5% 100V
1C4	4010060	22 nF —10 +100% 40V
1C5	4200285	4µ7F 63V
1C6	4010060	22 nF —10 +100% 40V
1C7	4130078	47 nF 20% 250V
1C8	4201058	0u47F 35V TANT.
1C9	4130103	100 nF 20% 250V.
1C10	4200285	0u47F 63V
1C11	4200016	20 µF 25V
1C12	4201069	2µ2F 35V
1C13	4130103	100 nF 10% 250V
1C14	4130103	100 nF 20% 250V
1C15	4130082	220 nF 20% 250V
1C16	4200169	0,1 µF 35V TANT.
1C17	4011025	3n3 10% 100V
1C18	4201057	1 µF 35V TANT.
1C19	4200108	4µ7F 25V TANT.
1C20	4201057	1 µF 35V TANT.
1C21	4200108	4µ7F 25V TANT.
1C22	4200108	4µ7F 25V TANT.
1C23	4200171	100 µF 35V

1C25	4011025	3n3F 10% 100V
1C27	4011025	3n3F 10% 100V
1C28	4130082	220 nF 20% 250V
1C29	4011025	3n3F 10% 100V
1C30	4130082	220 nF 20% 250V
1C31	4011025	3n3F 10% 100V
1C32	4201069	2u2F 35V TANT.
1C33	4201057	1 µF 35V TANT.
1C34	4130103	100 nF 20% 250V
1C35	4011025	3n3F 10% 100V
1C36	4201057	1 µF 35V TANT.

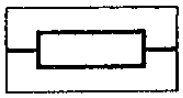
1RL1	7600007	

8005013 PC 3



3R1	5010059	10 KOhms 5% 1/8W

8005017 PC 4

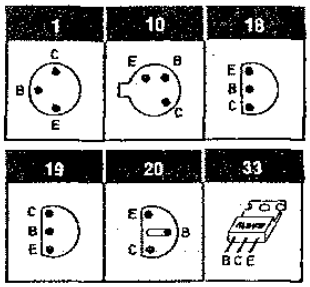


4R1	5010059	10 KOhms 5% 1/8W
4R2	5010059	10 KOhms 5% 1/8W

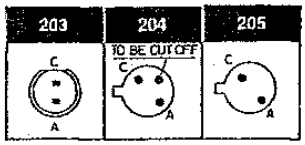
4C1	4010041	1 nF —20 +100% 40V
4C2	4010041	1 nF —20 +100% 40V

TRANSISTOR - DIODE - IC (DIAGRAM 1)

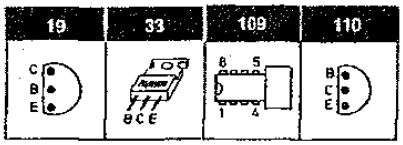
1TR1	8320097	8320097	20	BC547B	8320266 33 TIP 31
1TR2	8320266		18	BC237B	
1TR3	8320285		20	BC171B	8320285 20 BC183C
1TR4	8320161		19	BC317B	
1TR5	8320295		20	BC182B	8320295 20 BC 337-25
1TR6-1TR17	8320097		20	BC237B	
1TR18	8320161		1	BC207B	
1TR19	8320097				
1TR20	8320134	8320134	10	BC144/143	
1TR21	8320161		10	MM3005/4005	
1TR22-1TR23	8320134		10	BC142/143	
1TR24	8320097				
1TR25	8320134	8320161	20	BC212B	
1TR26	8320161		20	BC251B	



0D1	8300252	B80C800	1D17	8300053	ZPD 15V 5%
					BZX 79 15V
1D1-1D4	8300025	1N 4003			
		1N4002	1D20	8300101	BAX 16
		EM 502			
			1D49	8300135	ZPD 3,3V 5%
1D7	8300033	ZPD 22V 5%			BZY 88 3,3V
		BZX 79 22V			
			4D1	8300229	203 TIL 32
1D13	8300028	ZPD 9,1V 5%			203 OP 160
		BZX 79 9,1V			204 TIL 31
					204 1A 48B
1D16	8300201	ZPD 6,2V 5%			205 LD 241T
		BZX 79 6,2V	OTHER		
			DIODES	8300058	1N4148
					SFD 184



1IC1	8340026	33 TIP 120	1IC4	8340024	33 TIP 125
1IC2	8340028	19 MPS A13	4IC1	8340084	110 SRD 212
		19 SPS 5418			
1IC3	8340083	109 C1003			



MEASURING CONDITIONS FOR DIAGRAM 1

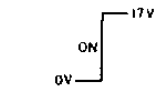
All DC voltages are positive in proportion to chassis and they are measured with rotating turntable and raised pick-up arm and with the detector arm over a record. The voltages are measured by voltmeter and an inner resistor of at least 2 MOhms.

The stated impulses of the detector arm circuit are measured with rotating turntable and with the detector arm over the ribs without any record on.

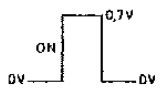
Oscillograms marked RUN-OFF STOP are measured with pick-up arm lowered into an outlet groove, rise approx. 3 mm/turns, 30 cm record.

SYMBOLS

As a supplement to the measuring specification symbols from the operating panel are used to indicate that a DC voltage in a circuit changes from one level to another e.g.



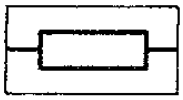
This symbol indicates that the voltage goes from 0 to 17 V when activating panel switch ON.



This symbol indicates that the voltage goes from 0 to 0,7 V, as long as the ON switch is activated, whereafter the voltage goes to 0 again.

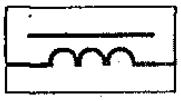
ELECTRIC PARTS LIST

8005015 PC 6

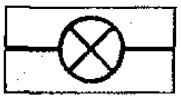


6R1 (201)	5010040	1 KOhms 5% 1/8W
6R2 (202)	5010665	1M2Ohms 5% 1/8W
6R3 (203)	5010049	100 KOhms 5% 1/8W
6R4 (204)	5010070	390 Ohms 5% 1/8W
6R5 (205)	5010063	150 KOhms 5% 1/8W
6R6 (206)	5370197	1 KOhms 20% 0,1 W
6R7 (207)	5010154	8K2Ohms 5% 1/8W
6R8 (208)	5010052	6K8Ohms 5% 1/8W
6R9 (209)	5010120	220 KOhms 5% 1/8W
6R10 (210)	5010135	18 KOhms 5% 1/8W
6R11 (211)	5370198	4K7 Ohms 20% 0,1W
6R12 (212)	5010067	560 Ohms 5% 1/8W
6R13 (213)	5010041	5K6 Ohms 5% 1/8W
6R14 (214)	5010052	6K8Ohms 5% 1/8W
6R15 (215)	5010053	15 KOhms 5% 1/8W
6R16 (216)	5010059	10 KOhms 5% 1/8W
6R17 (217)	5010063	150 KOhms 5% 1/8W
6R18 (218)	5010079	22 KOhms 5% 1/8W
6R19 (219)	5010079	22 KOhms 5% 1/8W
6R20 (220)	5010040	1 KOhms 5% 1/8W
6R21 (221)	5010040	1 KOhms 5% 1/8W
6R22 (222)	5010076	3K3Ohms 5% 1/8W
6R23 (223)	5010064	2K2Ohms
6R24 (224)	5010135	18 KOhms 5% 1/8W
6R25 (225)	5010076	3K3Ohms 5% 1/8W
6R26 (226)	5010067	560 Ohms 5% 1/8W
6R27 (227)	5010069	3K9Ohms 5% 1/8W
6R28 (228)	5010141	27 KOhms 5% 1/8W
6R29 (229)	5010141	27 KOhms 5% 1/8W
6R30 (230)	5010141	27 KOhms 5% 1/8W
6R31 (231)	5010041	5K6Ohms 5% 1/8W
6R32 (232)	5010079	22 KOhms 5% 1/8W
6R33 (233)	5010049	100 KOhms 5% 1/8W
6R34 (234)	5010079	22 KOhms 5% 1/8W
6R35 (235)	5010041	5K6Ohms 5% 1/8W
6R36 (236)	5010042	12 KOhms 5% 1/8W
6R37 (237)	5010074	680 KOhms 5% 1/8W
6R38 (238)	5010072	180 KOhms 5% 1/8W
6R39 (239)	5010059	10 KOhms 5% 1/8W
6R40 (240)	5010076	3K3Ohms 5% 1/8W
6R41 (241)	5010452	150 Ohms 5% 1/8W
6R42 (242)	5010044	330 Ohms 5% 1/8W
6R43 (243)	5370191	10 KOhms 20% 0,1W
6R44 (244)	5010061	56 KOhms 5% 1/8W
6R45 (245)	5010061	56 KOhms 5% 1/8W
6R46 (246)	5010076	3K3Ohms 5% 1/8W
6R47 (247)	5010052	6K8Ohms 5% 1/8W
6R48 (248)	5010052	6K8Ohms 5% 1/8W
6R49 (249)	5010040	1 KOhms 5% 1/8W
6R50 (250)	5010049	100 KOhms 5% 18W
6R51 (251)	5010079	22 KOhms 5% 1/8W
6R52 (252)	5010079	22 KOhms 5% 1/8W
6R53 (253)	5010072	180 KOhms 5% 1/8W
6R54 (254)	5010060	39 KOhms 5% 1/8W
6R55 (255)	5010052	6K8Ohms 5% 1/8W
6R56 (256)	5010135	18 KOhms 5% 1/8W
6R57 (257)	5010073	390 KOhms 5% 1/8W
6R58 (258)	5010045	47 KOhms 5% 1/8W
6R59 (259)	5010154	8K2Ohms 5% 1/8W
6R60 (260)	5010065	100 Ohms 5% 1/8W
6R61 (261)	5010077	470 KOhms 5% 1/8W
6R62 (262)	5010049	100 KOhms 5% 1/8W
6R63 (263)	5010063	150 KOhms 5% 1/8W
6R64 (264)	5010141	27 KOhms 5% 1/8W
6R65 (265)	5370196	22 KOhms 20% 0,1W
6R66 (266)	5010154	8K2Ohms 5% 1/8W
6R67 (267)	5010083	270 KOhms 5% 1/8W
6R68 (268)	5010060	39 KOhms 5% 1/8W
6R69 (269)	5010048	4K7Ohms 5% 1/2W
6R70 (270)	5010128	120 Ohms 5% 1/8W
6R71 (271)	5010061	56 KOhms 5% 1/8W
6R72 (272)	5010141	27 KOhms 5% 1/8W
6R73 (273)	5010049	100 KOhms 5% 1/8W
6R74 (274)	5010049	100 KOhms 5% 1/8W
6R75 (275)	5010141	27 KOhms 5% 1/8W
6R76 (276)	5370196	22 KOhms 20% 0,1W
6R77 (277)	5010079	22 KOhms 5% 1/8W
6R78 (278)	5010079	22 KOhms 5% 1/8W
6R79 (279)	5010079	22 KOhms 5% 1/8W
6R80 (280)	5010041	5K6Ohms 5% 1/8W
6R81 (281)	5010079	22 KOhms 5% 1/8W
6R82 (282)	5010079	22 KOhms 5% 1/8W
6R83 (283)	5010047	120 KOhms 5% 1/8W
6R84 (284)	5010047	120 KOhms 5% 1/8W
6R85 (285)	5010079	22 KOhms 5% 1/8W
6R86 (286)	5010054	1 MOhms 5% 1/8W
6R87 (287)	5010054	1 MOhms 5% 1/8W
6R88 (288)	5010054	1 MOhms 5% 1/8W
6R89 (289)	5010054	1 MOhms 5% 1/8W
6R90 (290)	5010073	390 KOhms 5% 1/8W
6R91 (291)	5010079	22 KOhms 5% 1/8W
6R100	5001021	330 Ohms 10% 1/2W
6R101	5010064	2K2Ohms 5% 1/8W
6R102	5010041	5K6Ohms 5% 1/8W
6R103	5010059	10KOhms 5% 1/8W
6R104	5010040	1 KOhms 5% 1/8W
6R105	5010045	47 KOhms 5% 1/8W
6R106	5010059	10 KOhms 5% 1/8W
6R107	5020095	13K3Ohms 5% 1/8W
6R108	5020093	4K64Ohms 5% 1/8W
6R109	5010076	3K3Ohms5% 1/8W
6R110	5010154	8K2Ohms 5% 1/8W
6R111	5010062	68 KOhms 5% 1/8W
6R112	5010135	18 KOhms 5% 1/8W
6R113	5010045	47 KOhms 5% 1/8W
6R114	5010048	4K7Ohms 5% 1/8W
6R115	5010049	100 KOhms 5% 1/8W
6R116	5010076	3K3Ohms 5% 1/8W
6R117	5010039	68 Ohms 5% 1/8W
6R118	5010052	6K8Ohms 5% 1/8W
6R119	5010153	1K2Ohms 5% 1/8W
6R120	5010064	2K2Ohms 5% 1/8W
6R121	5010049	100 KOhms 5% 1/8W
6R122	5010054	1MOhms 20% 0,1W
6R123	5010040	1KOhms 5% 1/8W
6R124	5010079	22 KOhms 5% 1/8W

6C1 (201)	4200333	1 µF 63V
6V2 (202)	4010021	220 pF 10% 100V
6C3 (203)	4011025	3n3F 10% 100V
6C4 (204)	4200101	10 µF 16V TANT.
6C5 (205)	4130109	10 nF 10% 250V
6C6 (206)	4010027	1 nF 10% 100V
6C7 (207)	4010027	1 nF 10% 100V
6C8 (208)	4010024	470 pF 10% 100V
6C9 (209)	4010027	1 nF 10% 100V
6C10 (210)	4010027	1 nF 10% 100V
6C11 (211)	4201058	0,47 µF 35V TANT.
6C12 (212)	4201057	1 µF 35V TANT.
6C13 (213)	4130109	10 nF 10% 250V
6C14 (214)	4010061	2n2 10% 63V
6C15 (215)	4010027	1 nF 10% 100V
6C16 (216)	4010065	2 n7F 10% 63V
6C17 (217)	4130141	8n2F 10% 250V
6C18 (218)	4010067	1n5F 10% 63V
6C19 (219)	4010064	5n6F 10% 63V
6C20 (220)	4010067	1n5F 10%
6C21 (221)	4000007	82 pF 2% 63V
6C22 (222)	4200108	4µ7F 25V TANT.
6C23 (223)	4200230	15 µF 16V TANT.
6C24 (224)	4130107	100 nF 10% 250V
6C25 (225)	4130109	10 nF 10% 250V
6C26 (226)	4010063	4n7F 10% 63V
6C27 (227)	4201057	1 µF 35V TANT.
6C28 (228)	4130111	150 nF 20% 250V
6C29 (229)	4201057	1 µF 35V TANT.
6C30 (230)	4011025	3n3F 10% 100V
6C31 (231)	4010060	22 nF —20 +100%
6C32 (232)	4200101	10 µF 16V TANT.
6C33 (233)	4130111	150 nF 20% 250V
6C34 (234)	4200101	10 µF 16V TANT.
6C35 (235)	4130089	22 nF 10% 250V
6C36 (236)	4130100	68 nF 10% 250V
6C37 (237)	4130100	68 nF 10% 250V
6C38 (238)	4130109	10 nF 10% 250V
6C39 (239)	4130100	68 nF 10% 250V
6C40 (240)	4201072	0,22 µF 35V TANT.
6C41 (241)	4010060	22 nF —20 +100%
6C42 (242)	4200317	47 µF 6,3V TANT.
6C43 (243)	4130143	18 nF 10% 250V
6C44 (244)	4010063	4n7F 10% 63V
6C45 (245)	4130119	39 nF 10% 250V
6C46 (246)	4130107	100 nF 10% 250V
6C47 (247)	4010063	4n7F 10% 63V
6C48 (248)	4200101	10 µF 16V TANT.
6C49 (249)	4010064	560 pF 10% 63V
6C50 (250)	4010067	1n5F 10% 63V
6C51 (251)	4000007	82 pF 2% 63V
6C52 (252)	4130100	68 nF 10% 250V
6C53 (253)	4130100	68nF 10% 250V
6C54 (254)	4130078	47 nF 20% 250V
(255)	4130078	47 nF 20% 250V
6C56	4000007	82 pF 2% 63V
6C100	4200099	100 µF 16V
6C101	4201057	1 µF 35V TANT.
6C102	4200180	1000 µF 16V
6C103	4201069	2µ2F 35V TANT.
6C104	4200171	100 µF 3V TANT.
6C105	4010027	1n 10% 100V

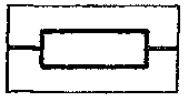


6L1 (201)	8022054	



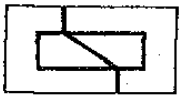
6IL100	8230044	24V 25 mA

8005014 PC 8



8R1	5010049	100 KOhms 5% 1/8W
8R2	5370049	1 MOhms 20% 0,1W
8R3	5010040	1 KOhms 5% 1/8W

8C1	4200098	100 µF 6,3V



8RL1	7600007	

MODIFICATIONS — SERVICE TIPS

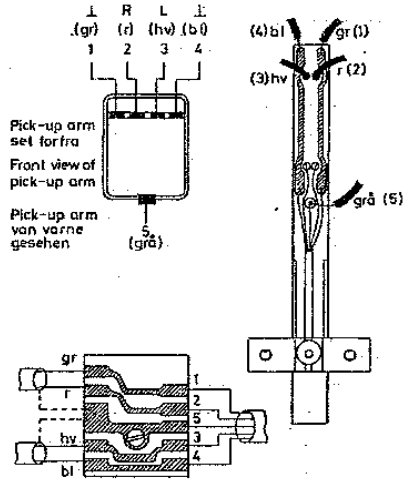
Automatic lowering

It has turned out that in some cases the charging of 1C19 in the automatic lowering circuit is not enough to secure that the pickup-arm does not lower when the detector arm reaches the blank field on the turntable without record.
To solve this problem 1C20 has been changed from 4.7 to 1 µF.
The change has been introduced from apparatus No. 1167004.
Furthermore, IC26 from base 1TR13 to chassis has been left out to secure that manual lowering works at fast out-transport of the pickup-arm.

Detector arm circuit

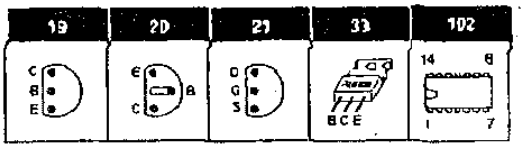
Because of tolerances in OPH1, 1TR3 has been changed into a transistor with greater current amplification from index. No. 8320097 to index No. 8320285.
the change has been introduced in production as from No. 1168008.
For a transitional period (from set No. 1168008 to No. 1175021) 1R26 has been changed from 1 Mohm into 4.7 Mohms.
If the arm does not lower by some record types, 1R26 can be changed into 1 Mohm.

Mounting of leads in the pickup-arm



TRANSISTOR - DIODE - IC (DIAGRAM 2)

6TR1 (201)	8320137		6TR14 (214)	8320137		8320137	20 BC 137B
6TR2 (202)	8320137		6TR15 (215)	8320366			
6TR3 (203)	8320161		6TR16 (216)	8320366		*8320161*	*20 BC212B*
6TR4 (204)	8320137		6TR100	8320323			20 BC 251B
6TR5 (205)	8320366		6TR101	8320323			
6TR6 (206)	8320137		6TR102	8340026		8320323	19 MPS A05
6TR7 (207)	8320354		6TR103	8320323			
6TR8 (208)	8320137		6TR104	8340054		8320354	21 SK 3DA
6TR9 (209)	8320137		6TR105	8320137			
6TR10 (210)	8320137		6TR106	8320323		8320366	19 MPS A16
6TR11 (211)	8320354		6TR107	8320323			
6TR12 (212)	8320137		6TR108	8340054		8340026	33 TIP 120
6TR13 (213)	8320354						
						8340054	19 MPS A13



6D1 (201)-			6D103	8300142	AA 143	8D1	8300042	OA 91
6D6 (206)	8300142	AA 143			OA 47			
		OA 47				8D2	8300058	1N4148
			6D104	8300131	1N 4148			SFD 184
6D100	8300029	ZPD 12V 5%						
		BZX 79 12V	6D105	8300131	1N4148			
6D101	8300128	ZPD 5,6V 5%	6D106	8300142	AA 143			
		BZX 79 5,6V			OA 47			
6D102	8300029	ZPD 12V 5%	6D107	8300131	1N4148			
		BZX 79 12V						
			6D108	8300131	1N4148			

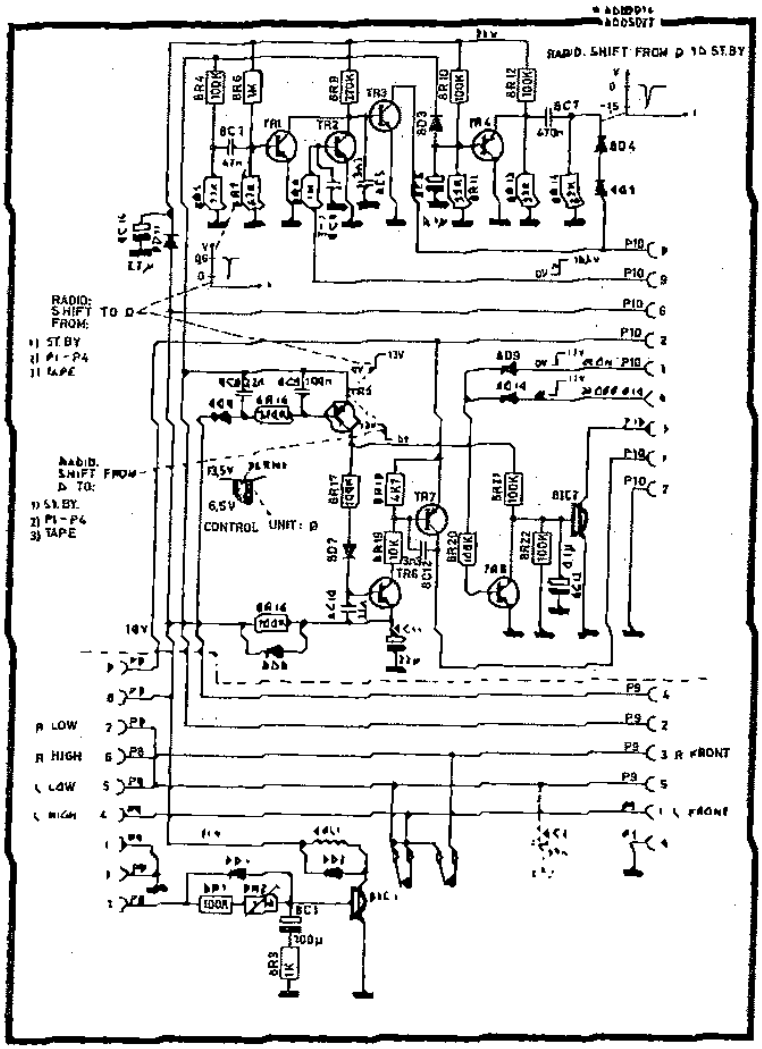
6IC1 (201)		
6IC1 (201)	8340038	102 LM 381
6IC2 (202)	8340040	102 LM 565
8IC1	8340028	19 MPS A13
		19 SPS 5418

MEASURING CONDITIONS FOR DIAGRAM 2

The voltages indicated are positive in relation to ground and measured with CD-4 signal on the input, R6 and R206 in centre position (500 Ohms) and R11 and R211 on maximum.

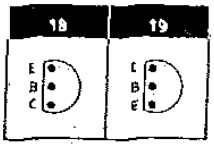
Input: Sum 1 kHz 1,8 mV, differens 2 mV 30 kHz $\Delta f = 1{,}8$ kHz f mod = 1 kHz.

DIAGRAM 2 FOR BEOGRAM 4002
AND 4004

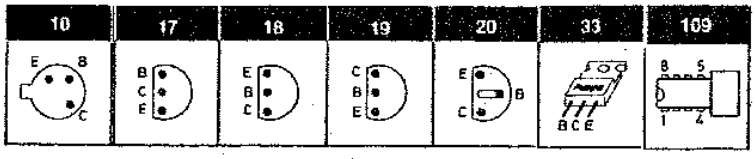


TRANSISTOR AND IC LIST FOR DIAGRAM 2			
8IC1-8IC2	8340028	19	MPSA 13
		19	TPSA 13
8TR1-8TR3	8320097	18	BC 547 B
		18	BC 182 B
		18	BC 237 B
		18	BC 171 B
8TR4-8TR5	8320152	18	BC 557 B
		18	BC 212 B
		18	BC 307 B
		18	BC 251 B
8TR6	8320097	18	BC 547 B
		18	BC 182 B
		18	BC 237 B
		18	BC 171 B
8TR7	8320152	18	BC 557 B
		18	BC 212 B
		18	BC 307 B
		18	BC 251 B
8TR8	8320097	18	BC 547 B
		18	BC 182 B
		18	BC 237 B
		18	BC 171 B

DIODE LIST FOR DIAGRAM 2		
8D1	8300042	OA 91
8D2-8D11	8300058	IN 4148



TRANSISTOR AND IC LIST FOR DIAGRAM 1			
1IC1	8340026	33	TIP 120
1IC2	8340028	19	MPSA 13
		19	TPSA 13
1IC3	8340083	109	C 1003
1IC4	8340024	33	TIP 125
1TR1	8320097	18	BC 547 B
		18	BC 182 B
		18	BC 237 B
		18	BC 171 B
1TR2	8320266	33	TIP 31
1TR3	8320285	18	BC 548 C
		18	BC 183 C
1TR4	8320152	18	BC 557 B
		18	BC 212 B
		18	BC 307 B
		18	BC 251 B
1TR5	8320295	20	BC 337-25
1TR6-1TR17	8320097	18	BC 547 B
		18	BC 182 B
		18	BC 237 B
		18	BC 171 B
1TR18	8320152	18	BC 557 B
		18	BC 212 B
		18	BC 307 B
		18	BC 251 B
1TR19	8320097	18	BC 547 B
		18	BC 182 B
		18	BC 237 B
		18	BC 171 B
1TR25/1TR20	8320135	10	BC 143/144
		10	MM 3005/4005
		10	BC 142/143
1TR21	8320152	18	BC 557 B
		18	BC 212 B
		18	BC 307 B
		18	BC 251 B
1TR22/1TR23	8320135	10	BC 143/144
		10	MM 3005/4005
		10	BC 142/143
1TR24	8320097	18	BC 547 B
		18	BC 182 B
		18	BC 237 B
		18	BC 171 B
1TR26	8320152	18	BC 557 B
		18	BC 212 B
		18	BC 307 B
		18	BC 251 B
4IC1	8340084	17	SRD 212



DIODE LIST FOR DIAGRAM 1		
0D1	8300252	B 80 C 800
1D1-1D4	8300023	1N 4002
1D5-1D6	8300058	1N 4148
		SFD 184
1D7	8300033	ZPD 22 V 5%
		BZX 79 22 V
1D8-1D12	8300058	1N 4148
		SFD 184
1D13	8300028	ZPD 9,1 V 5%
		BZX 79 9,1 V
1D14-1D15	8300058	1N 4148
		SFD 184
1D16	8300201	ZPD 6,2 V 5%
		BZX 79 6,2 V
1D17	8300053	ZPD 15 V 5%
		BZX 79 15 V
1D18-1D19	8300058	1N 4148
		SFD 184
1D20	8300101	BAX 16
1D21-1D48	8300058	1N 4148
		SFD 184.
1D49	8300135	ZPD 3,3V 5%
		BZX 88 3,3 V
4D1	8300229	OP 160

ELECTRICAL PARTS LIST

8005016/8005027 PC 1

1R1	5002028	2K2 ohms 10% 1 W
1R2	5002026	1K5 ohms 10% 1 W
1R3	5010048	4K7 ohms 5% 1/8 W
1R4	5010061	56 kohms 5% 1/8 W
1R5	5010092	220 ohms 5% 1/8 W
1R6	5010091	82 kohms 5% 1/8 W
1R7	5010135	18 kohms 5% 1/8 W
1R8	5001038	4K7 ohms 10% 1/2 W
1R9	5010072	180 kohms 5% 1/8 W
1R10	5010091	82 kohms 5% 1/8 W
1R11	5010071	560 kohms 5% 1/8 W
1R12	5001021	330 ohms 10% 1/2 W
1R13	5100198	10 ohms 10% 4W TE
1R14	5370058	5 kohms 20% LIN
1R15	5370058	5 kohms 20% LIN
1R16	5020112	6K8 ohms 1% 1/8 W
1R17	5020059	10 kohms 1% 1/8 W
1R18	5010060	39 kohms 5% 1/8 W
1R19	5010045	47 kohms 5% 1/8 W
1R20	5010091	82 kohms 5% 1/8 W
1R21	5010000	270 ohms 5% 1/8 W
1R23	5010068	820 ohms 5% 1/8 W
1R24	5010049	100 kohms 5% 1/8 W
1R25	5010120	220 kohms 5% 1/8 W
1R26	5010054	1 Mohms 5% 1/8 W
1R27	5010053	15 kohms 5% 1/8 W
1R28	5010053	15 kohms 5% 1/8 W
1R29	5010053	15 kohms 5% 1/8 W
1R30	5010045	47 kohms 5% 1/8 W
1R31	5010154	8K2 ohms 5% 1/8 W
1R32	5010049	100 kohms 5% 1/8 W
1R33	5010072	180 kohms 5% 1/8 W
1R34	5010054	1Mohms 5% 1/8 W
1R35	5010076	3K3 ohms 5% 1/8 W
1R36	5002018	270 ohms
1R37	5010071	560 kohms 5% 1/8 W
1R38	5010066	1K8 ohms 5% 1/8 W
1R39	5010049	100 kohms 5% 1/8 W
1R40	5001085	22 Mohms 10% 1/2 W
1R41	5010065	100 ohms 5% 1/8 W
1R42	5010049	100 kohms 5% 1/8 W
1R43	5010054	1 Mohms 5% 1/8 W
1R44	5010117	330 kohms 5% 1/8 W
1R45	5010054	1 Mohms 5% 1/8 W
1R46	5010117	330 kohms 5% 1/8 W
1R47	5010065	100 ohms 5% 1/8 W
1R48	5010049	100 kohms 5% 1/8 W
1R49	5010040	1 kohms 5% 1/8 W
1R50	5010059	10 kohms 5% 1/8 W
1R51	5010141	27 kohms 5% 1/8 W
1R52	5010298	2K7 ohms 5% 1/8 W
1R53	5010154	8K2 ohms 5% 1/8 W
1R54	5010448	22 ohms 5% 1/8 W
1R55	5010042	12 kohms 5% 1/8 W
1R56	5370068	25 kohms 20% 0,1 W LIN
1R57	5370068	25 kohms 20% 0,1 W LIN
1R58	5010045	47 kohms 5% 1/8 W
1R59	5010042	12 kohms 5% 1/8 W
1R60	5010059	10 kohms 5% 1/8 W
1R61	5010059	10 kohms 5% 1/8 W
1R62	5010083	270 kohms 5% 1/8 W
1R63	5010071	560 kohms 5% 1/8 W
1R64	5010059	10 kohms 5% 1/8 W
1R65	5010117	330 kohms 5% 1/8 W
1R66	5010049	100 kohms 5% 1/8 W
1R67	5010059	10 kohms 5% 1/8 W
1R68	5010072	180 kohms 5% 1/8 W
1R69	5010072	180 kohms 5% 1/8 W
1R70	5010072	180 kohms 5% 1/8 W
1R71	5010072	180 kohms 5% 1/8 W
1R72	5010072	180 kohms 5% 1/8 W
1R73	5010072	180 kohms 5% 1/8 W
1R74	5010072	180 kohms 5% 1/8 W
1R75	5010072	180 kohms 5% 1/8 W
1R76	5010072	180 kohms 5% 1/8 W
1R77	5010072	180 kohms 5% 1/8 W
1R78	5010072	180 kohms 5% 1/8 W
1R79	5010072	180 kohms 5% 1/8 W
1R80	5010079	22 kohms 5% 1/8 W
1R81	5010091	82 kohms 5% 1/8 W
1R82	5010054	1 Mohm 5% 1/8 W
1R83	5010120	220 kohms 5% 1/8 W
1R84	5010135	18 kohms 5% 1/8 W
1R85	5010048	4K7 ohms 5% 1/8 W
1R86	5010048	4K7 ohms 5% 1/8 W
1R87	5002024	1 kohm 10% 1W
1R88	5370068	25 kohms 20% 0,1 W LIN
1R89	5010092	220 ohms 5% 1/8 W
1R90	5010049	100 kohms 5% 1/8 W
1R91	5010049	100 kohms 5% 1/8 W
1R92	5010135	18 kohms 5% 1/8 W
1R93	5010042	12 kohms 5% 1/8 W
1R94	5010059	10 kohms 5% 1/8 W

1C1	4200169	0,1µF 35 V TANT
1C2	4200342	10µF 63 V
1C3	4130142	220 nF 5% 100 V
1C4	4010060	22 nF −20 +100% 40V
1C5	4200322	4µ7F 63 V
1C6	4010060	22 nF −20 +100% 40V
1C7	4130078	47 nF 20% 250 V
1C8	4201058	0,47µF 35 V TANT
1C9	4130103	100 nF 20% 250 V
1C10	4130106	330 nF 20% 100 V
1C11	4200016	20µF 25 V
1C12	4201069	2µ2F 35 V TANT
1C13	4130103	100 nF 20% 250 V
1C14	4130103	100 nF 20% 250 V
1C15	4130082	220 nF 20% 250 V
1C16	4200169	0,1µF 35 V TANT
1C17	4011025	3n3F 10% 100 V
1C18	4201057	1µF 35 V
1C19	4200108	4µ7F 25 V
1C20	4201057	1µF 35 V TANT
1C21	4200108	4µ7F 25 V TANT
1C22	4200108	4µ7F 25 V TANT
1C23	4200171	100µF 3V TANT
1C24	4010060	22 nF −2 +100% 40 V
1C25	4011025	3n3 10% 100 V
1C27	4011025	3n3 10% 100 V
1C28	4130082	220 nF 20% 250 V
1C29	4011025	3n3F 10% 100 V
1C30	4130082	220 nF 20% 250 V
1C31	4011025	3n3F 10% 100 V
1C32	4201069	2µ2F 35 V TANT
1C33	4201057	1µF 35 V TANT
1C34	4130103	100 nF 20% 250 V
1C35	4011025	3n3F 10% 100 V
1C36	4200108	4µF 35 V TANT

1RL1	7600007	

8005013 PC 3

3R1	5010059	10 kohms 5% 1/8 W

8005017 PC 4

4R1	5010059	10 kohms 5% 1/8 W	4R2	5010059	10 kohms 5% 1/8 W
4C1	4010041	1 nF –20 +100% 40 V	4C2	4010041	1 nF –20 +100% 40 V

8005014/8005022 PC8

8R1	5010049	100 kohms 5% 1/8 W	8R12	5010049	100 kohms 5% 1/8 W
8R2	5370049	1 Mohm 20% 0,1 W LIN	8R13	5010075	33 kohms 5% 1/8 W
			8R14	5010079	22 kohms 5% 1/8 W
8R3	5010040	1 kohm 5% 1/8 W	8R15	5010117	330 kohms 5% 1/8 W
8R4	5010049	100 kohms 5% 1/8 W	8R16	5010049	100 kohms 5% 1/8 W
8R5	5010079	22 kohms 5% 1/8 W	8R17	5010049	100 kohms 5% 1/8 W
8R6	5010054	1 Mohms 5% 1/8 W	8R18	5010048	4K7 ohms 5% 1/8 W
8R7	5010045	47 kohms 5% 1/8 W	8R19	5010059	10 kohms 5% 1/8 W
8R8	5010054	1 Mohms 5% 1/8 W	8R20	5010049	100 kohms 5% 1/8 W
8R9	5010083	270 kohms 5% 1/8 W	8R21	5010049	100 kohms 5% 1/8W
8R10	5010049	100 kohms 5% 1/8 W	8R22	5010049	100 kohms 5% 1/8 W
8R11	5010060	39 kohms 5% 1/8 W			
8C1	4200098	100µF 10 V	8C9	4130150	100 nF 20% 100 V
8C2	4130078	47 nF 20% 250 V	8C10	4010060	22 nF –20 +100% 40 V
8C3	4130078	47 nF 20% 250 V			
8C4	4011025	3n3F 10% 100 V	8C11	4200100	22µF 40 V
8C5	4011025	3n3F 10% 100 V	8C12	4011025	3n3F 10% 100 V
8C6	4200169	0,1µF 35 V TANT			
8C7	4130114	470 nF 10% 100 V			
8C8	4010060	22 nF – 20 +100% 40 V	8C13	4200169	0,1µF 35 TANT
			8C14	4201069	2µ2 35 V TANT
8RL1	7600007				

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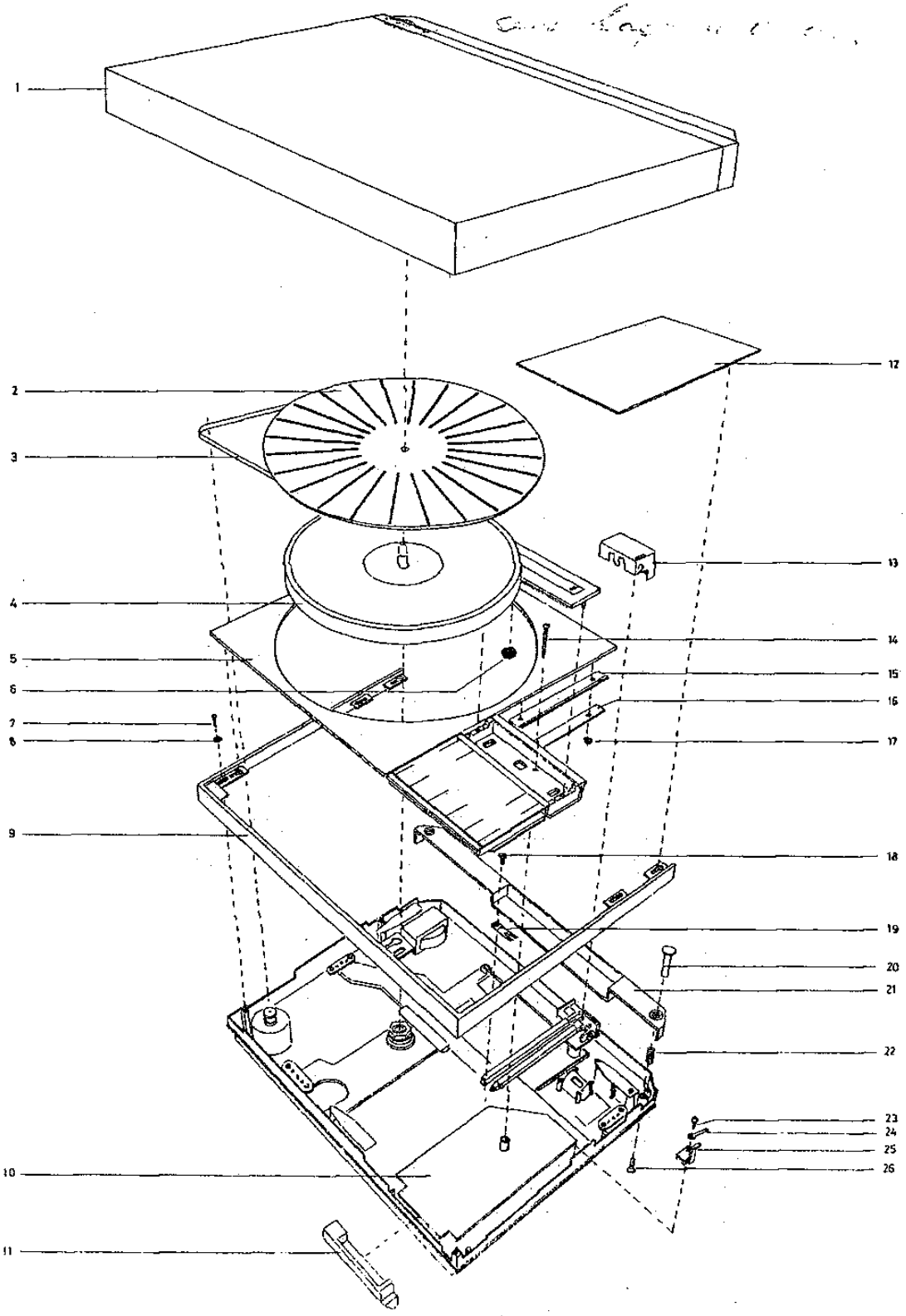
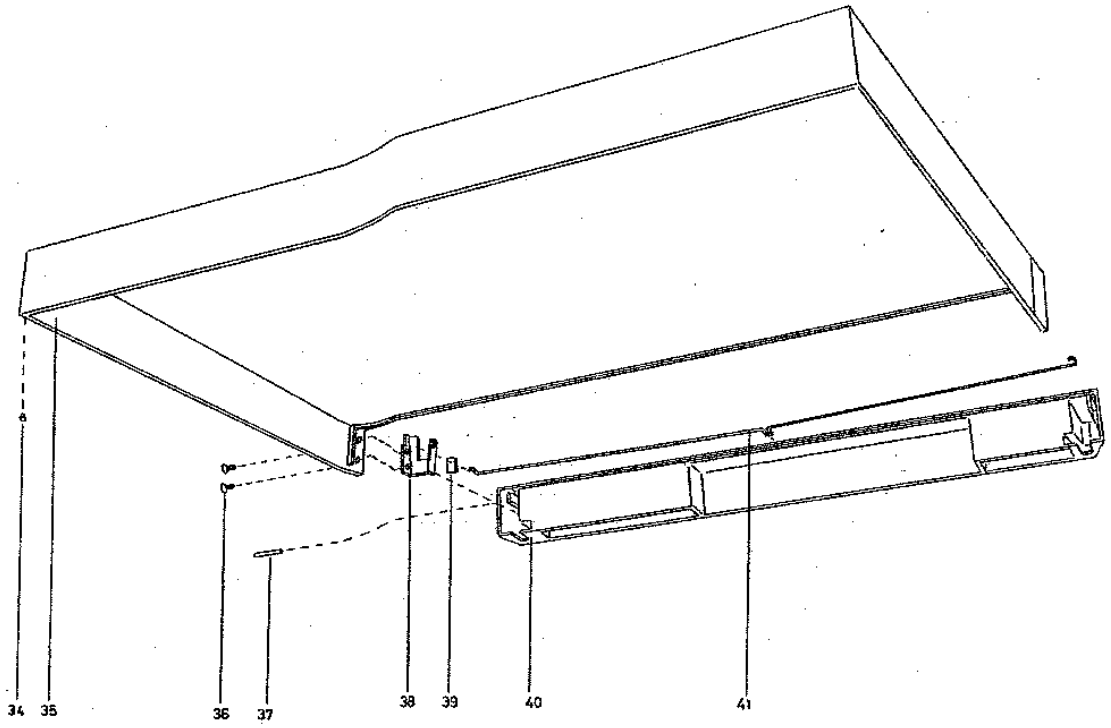
MECHANICAL PARTS LIST



1	3164184	Dust cover complete
	2560039	Decorative list
2	2726084	Turntable
3	2732018	Driving belt
4	2726089	Turntable
5	3458154	Topplate
		Plastic foil (transport)
6	3912037	Felt washer
7	2013002	Screw 2.9 x 6.5 DIN 7982
8	2803007	Guide washer
9	3412051	Cabinet, teak
	3412053	Cabinet, rosewood
	3412054	Cabinet, oak
	3412055	Cabinet, white
10	8005014	PC unit 4002
	8005022	PC unit 4004
11	3152159	Holder
12	3458114	Topplate
	3946018	Plastic foil
13	3164142	Cover
	3917022	Foam (trans)
14	2013088	Screw 2.9 x 3
15	2816085	Spring
16	3014023	Guiding plate
17	2380093	Nut, nylon
18	2015903	Screw 3.5 x 9.52
19	2816083	Spring
20	2994012	Nut
21	3452268	Back piece
22	2810066	Spring
23	2013206	Screw 2.9 x 16 DIN
24	7530008	Solder tag
25	3152135	Lead holder
26	2042216	Screw 4 x 16 DIN 84



34	3010007	Stop
35	3164190	Lid
	2560039	Decorative list
36	2038055	Screw AM 3 x 6 DIN 963, black
37	2830014	Bearing needle
38	3030023	Hinge, left
	3030022	Hinge, right
39	3015030	Guiding piece
40	3452145	Back piece
41	2819062	Spring

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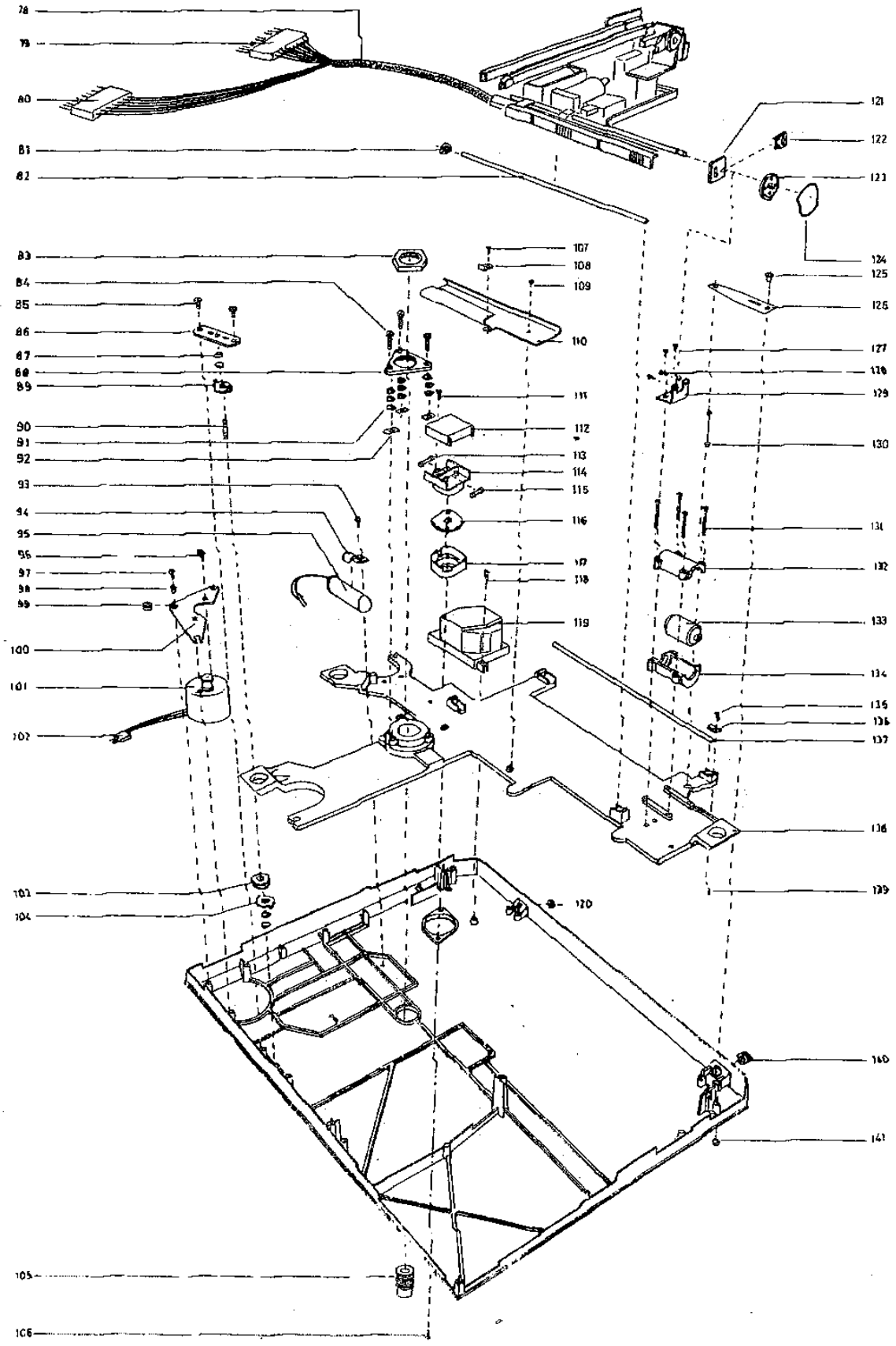
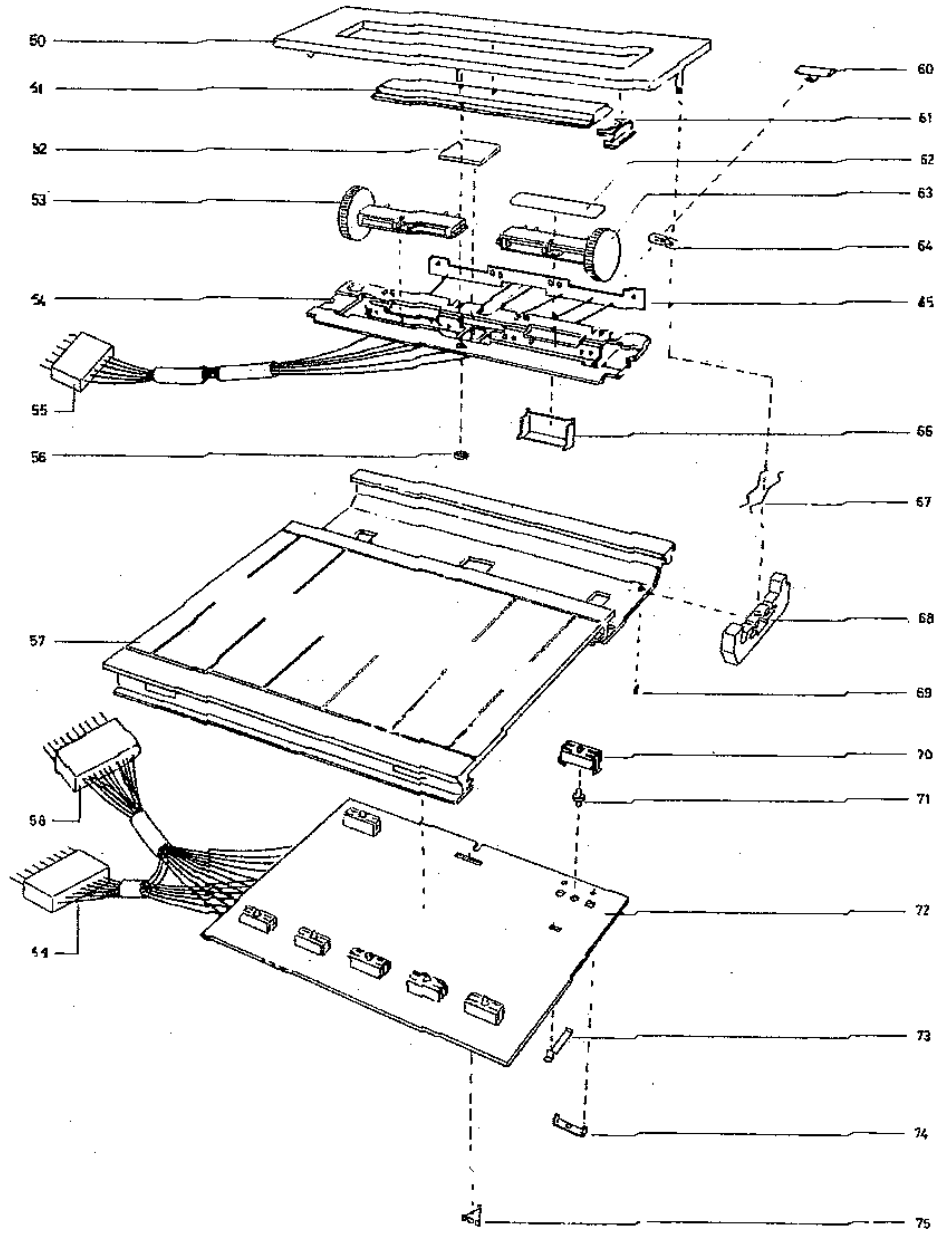
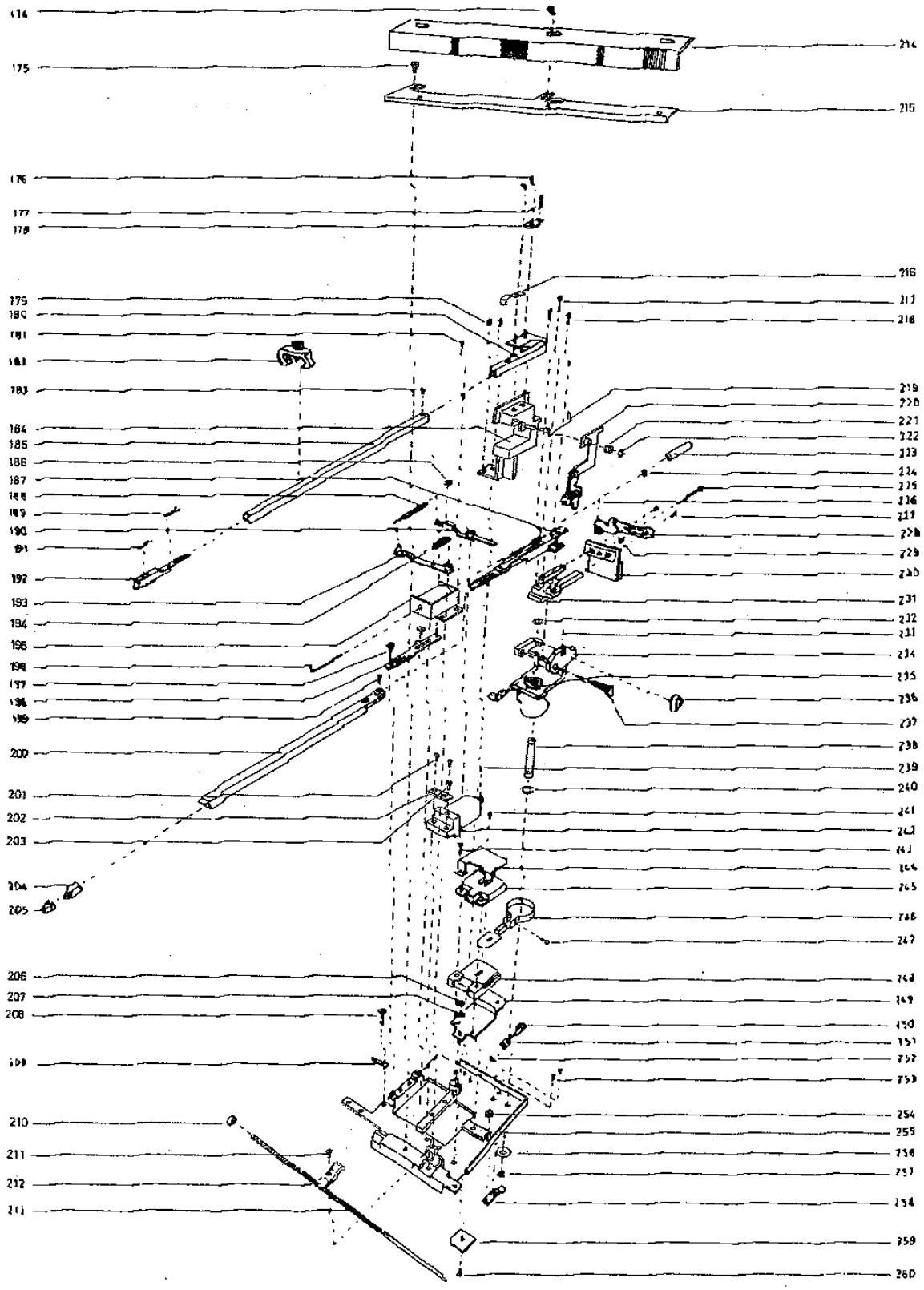




50	3458121	Top plate
51	3199046	Dial
52	3164179	Cover
53	5300090	Potentiometer
54	3131085	Housing for potentiometer
55	7220057	Housing 6 pol. without pins
	7500076	Contact pin
56	2395034	Spire
57	8055020	Chassis 4002
	8055022	Chassis 4004
58	7220052	Housing 10 pol. without pins
59	7220056	Housing 9 pol. without pins
	7500076	Housing
60	3358116	Heat sink
61	3199047	End piece
62	3180621	Sticker
63	5300091	Potentiometer
64	8230052	Lamp 14V 40 mA
65	6140376	PC board
66	3300044	Screen
67	2819096	Spring
68	3152129	Holder
69	2072701	Threaded DIN M3 x 4 DIN 438
70	3152068	Holder
71	7500067	Contact pin
72	8005018	PC board 4002
	8005029	PC board 4004
73	7500075	Contact spring
74	7500050	Contact bridge
75	2816111	Locking spring

78	6275391	Movable wire bundle
79	7220036	Housing 11 pol.
80	7220056	Housing 9 pol.
	7500076	Housing
81	2905045	Bearing
82	2830049	Shaft
83	2380096	Nut
84	2038216	Screw 3 x 10 DIN 84
85	2015903	Screw 3.5 x 9.52
86	3014021	Guide
87	2624038	Washer
88	2641076	Clamp
89	2381008	Wing nut
90	2993024	Threaded pin
91	2624027	Spring washer
92	2390020	Spire, nylon
93	2013202	Screw 2.9 x 9.5 DIN 7981
94	2510030	Clamp
95	4200335	El. capacitor
	7500076	Housing
96	2036201	Screw 2.6 x 3 DIN 84
97	2013202	Screw 9.5 x 2.9 DIN 7981
98	2365114	Bushing
99	2938132	Rubber bushing
100	3151156	Holder for motor
101	8400078	Motor
	2722019	Belt washer
102	7220037	Housing 3 pol.
	7500076	Housing
103	2938099	Rubber bushing
104	2381007	Wing nut
105	2938118	Bearing
106	2013012	Screw 2.9 x 13 DIN 7982
107	2013202	Screw 2.9 x 9.5 DIN 7981
108	2514032	Clamp
109	2013002	Screw 2.9 x 6.5 DIN 7982
110	3013017	Guide rail
111	2038247	Screw 3 x 6 DIN 84
112	3164109	Cover
113	6600000	Fuse 250 mA-T 250 V
	3180607	Label for fuse
114	3131118	Housing for fuse
115	6600000	Fuse 250 mA-T 250 V
116	7400062	Mains voltage switch
117	3131050	Housing for mains voltage switch
118	2013202	Screw 2.9 x 9.5 DIN 7981
119	8013187	Transformer
120	2641062	Clamp, upper part
	2641061	Clamp, bottom part
121	2905056	Bearing for spindle
122	2905055	Bearing for spindle
123	2722014	Belt washer
	2072920	Threaded pin M2 x 6 DIN 551
	2380068	Square nut M2
124	2732032	Servo belt *
125	2380108	Special nut
126	2816081	Leaf spring
127	2038208	Screw 3 x 5 DIN 84
128	2038208	Screw 3 x 5 DIN 84
129	2530253	Bracket
130	3955022	Strop
131	2038235	Screw AM 3 x 25 DIN 84
132	3131084	Housing for motor
133	8400080	Motor
	3333080	Damping for motor (foam)
	3912042	Felt washer
134	3131084	Housing for motor
135	2038216	Screw AM 3 x 10 DIN 84
136	2644003	Clamp
137	2830045	Shaft
138	3114105	Chassis
139	2072705	Threaded pin M3 x 4
140	2938077	Rubber bushing
141	3103067	Foot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174	2038952	Screw 3 x 4 DIN 963
175	2038206	Screw 3 x 4 DIN 84
176	2038247	Screw AM 3 x 6 mm DIN84
177	2072918	Threaded pin M3 x 15 mm
178	3151086	Holder
179	2038247	Screw AM 3 x 6 mm DIN84
	2625002	Tooth-lock washer
	7530008	Solder tag
180	3152076	Holder
181	2032208	Screw AM 3 x 5 mm DIN84
182	3391407	Transit protection
183	2034236	Screw AM 2 x 3 mm DIN84
184	3152145	Holder for cover
	3947421	Tape
	2645025	Plate
185	3937808	Slave arm
186	2390004	Circlip UG 3 x 0.6
187	3152179	Holder for pickup arm complete
188	2810083	Spring
189	8760002	Foto cell
190	2853025	Arm
191	8230055	Lamp 6V
192	3375026	Optics
193	2853045	Arm
194	2810087	Spring
195	6810006	Magnet coil
196	2850047	Press bar
197	2038948	Screw
198	2852035	Change lever
199	2034236	Screw AM 2 x 3 mm DIN84
200	2850077	Pickup arm
201	2038216	Screw AM 3 x 10 mm DIN 84
202	2641075	Clamp
203	2072911	Adjustment screw
204	8954410	Pickup MMC 4000
	3624008	Service-kit for pickup
205	3302230	Cap for pickup
206	2038948	Screw
207	2624021	Washer
208	2038208	Screw AM 3 x 5 DIN 84
209	7530023	Solder tag
210	2389031	Bearing nut
211	2038208	Screw AM 3 x 5 DIN 84
212	3152074	Holder
213	2993028	Spindle
214	3199049	Dial
215	3151139	Holder for dial
216	2816116	Spring
217	2034220	Screw AM 2 x 12 DIN 84
218	2034211	Screw AM 2 x 6 DIN 84
219	2819061	Spring
220	2851083	Lifting arm complete
	2812065	Spring
	2034219	Screw AM 2 x 10 DIN 84
221	2812041	Spring
222	2390004	Circlip
223	2894029	Armature
224	2802023	Washer
225	2038233	Screw AM 3 x 20 DIN 84
226	2072701	Threaded pin M3 x 4 mm
227	2034231	Screw AM 2 x 4 DIN 84
228	2854023	Arm
229	2390001	Circlip
230	3342030	Counterweight
231	3152162	Holder for counterweight
232	2390046	Circlip
233	2070400	Threaded pin M2 x 3 mm
234	3150032	Bearing holder
	2900003	Ball bearing
	2622168	Washer, brass
	2812036	Spring
	2390047	Circlip
235	2548109	Bracket
236	2700008	Adjustment bushing
237	2834041	Shaft collected
238	2831025	Shaft
239	2365085	Valve
240	2390046	Circlip
241	2038206	Screw AM 3 x 4 DIN 84
242	3131123	Damper cylinder
243	2038222	Screw AM 3 x 14 DIN 84
244	2530350	Bracket
245	3164196	Housing with lamp
246	2854059	Diaghragmarm
247	2013203	Screw 2.84 x 12.7 ART 4261
248	3131052	Housing for foto resistor
	5210004	Foto resistor
249	3151085	Holder
250	2038946	Screw
251	2794029	Roller
252	2622041	Washer
253	2038208	Screw AM 3 x 5 DIN 84
254	2798003	Exentrik
255	3114068	Chassis, slide
256	2624028	Thrust washer
257	2390046	Circlip
258	2510086	Bracket
259	6140417	PC-board
260	2038206	Screw AM 3 x 4 DIN 84

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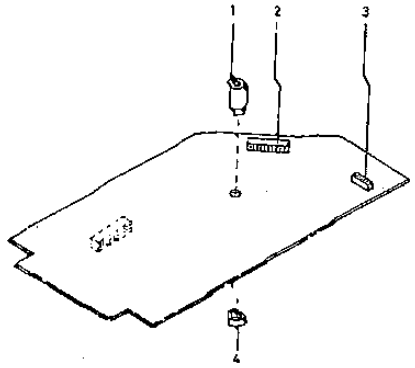
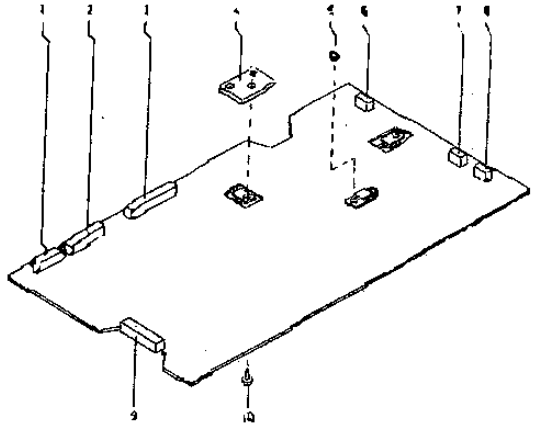
PARTS LIST FOR PC-BOARD 8005014/ 8005022 (MEC.)



08

1	2938093 Bushing, support tube	3	7210026 Socket 6 pol.
2	7210091 Socket 9 pol.	4	2938092 Bushing for support tube

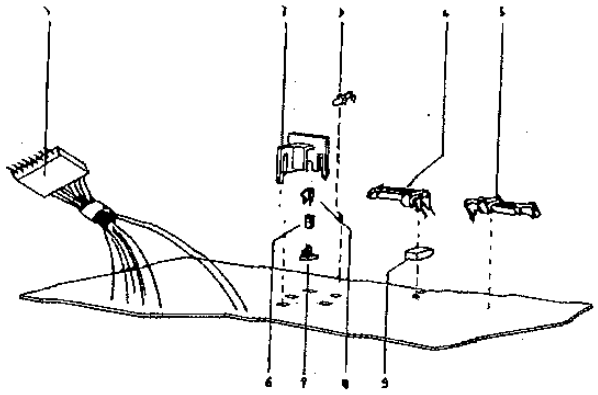
PARTS LIST FOR PC-BOARD 8005016/ 8005027 (MEC.)



01

1	7210105 Socket 6 pol.	5	2365105 Valve for transistor
2	7210065 Socket 8 pol.	6	7210104 Socket 4 pol.
3	7210106 Socket 11 pol.	7	7210103 Socket 3 pol.
4	3558109 Heat sink for transistor	8	7210103 Socket 3 pol.
	2622248 Mica sheet for transistor	9	7210097 Socket 10 pol.
	3172074 Insulating bushing for transistor	10	2013202 Screw for transistor

PARTS LIST FOR PC-BOARD 8005017 (MEC.)



04

1	7210051 Housing 8 pol.	5	7400115 Microswitch
	7500076 Contact pin	6	2816130 Leaf spring
2	3131099 Housing	7	3454170 Bottom piece
3	8300229 Light diode		3947518 Tape
4	7400115 Micorswitch	8	8340084 Transistor
		9	3103077 Rod

PARTS NOT SHOWN

6270193	PU lead mounted	3535060	Instruction diagram
6270199	PU lead with socket/remote control	3391384	Outer carton
7220163	Plug 7 pol.	3391385	Top/bottom insert
6100012	Mains lead	3397157	Lid insert
6270194	Chassis cable	3397158	Packing, left
6273771	Lead set	3397159	Packing, right

Corrections to parts list in service manual for Beogram 4002, type 5513

Pos.		
40	Obsolete	
57	8055020	Chassis, Komplet 4002
87	2624038	Spring washer
104	2624038	Spring washer
140	Obsolete	
141	Obsolete	
142	Obsolete	
143	Obsolete	
144	Obsolete	
147	Obsolete	
148	Obsolete	
150	Obsolete	
	2530350	Bracket for housing 244

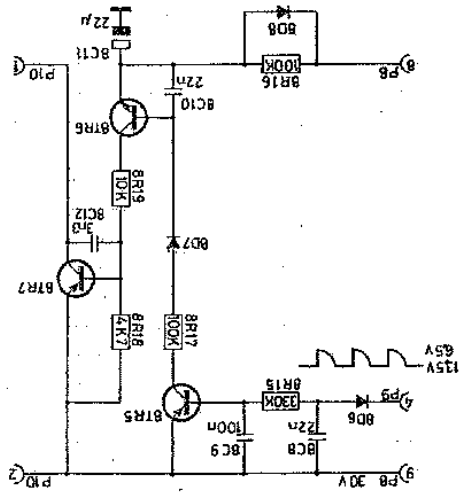
ELECTRICAL DESCRIPTION

Remote control

Some functions in the Beogram 4004 can be performed by means of the Beomaster 2400 remote control unit.
The table below shows which functions are activated when the remote control unit is operated.

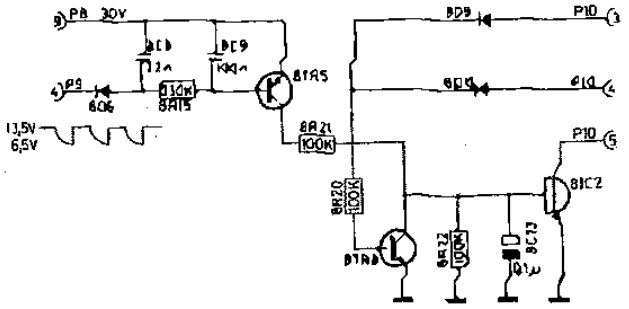
First time PHONO is depressed	Record player starts, slide travels in and pick-up arm lowers if there is a record on the turntable.
Second time PHONO is depressed	Pick-up arm rises (pause begins).
Third time PHONO is depressed	Pick-up arm lowers (pause ends).
Change to another program during playing of record	Pick-up arm rises and slide returns.
Change to another program during pause (pick-up arm in lifted position)	Slide does not return, and pick-up arm lowers if PHONO button is again operated.
Depressing STAND BY on both remote control unit and radio set	Slide will return regardless of function being performed by record player.

The electrical circuits which process the remote control information in the Beogram 4004 consist, in principle, of three blocks: a start function, a rise/lower function, and a stop function. The circuits receive two bits of information from the Beomaster 2400 through two extra pins in the DIN connector.

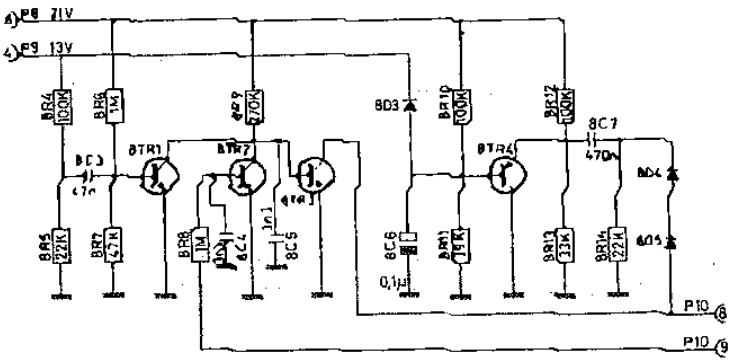


When the PHONO button is operated, pin 2 of P9 receives 13 volts and pin 4 of P9 receives approx. 6.5 volts. The emitter of 8TR5 receives 13 volts and the cathode of 8D6 receives 6.5 volts, 8TR5 is forward biased.

The collector of 8TR5 goes high and 8TR6 is forward biased throug 8R17, 8D7 and 8C11. 8TR7 is forward biased through 8R19, 8TR6 and 8C11 until 8C11 is fully charged. The collector of 8TR7 goes high, and this high level is fed to the START wire in the power supply section. The power supply turns on, slide transport starts, and the emitter of 8TR6 receives 21 volts througt 8R16, thereby locking the circuit until the slide has returned and the SO contact has been operated. When the PHONO button is released, the voltage at the cathode of 8D6 leaps back to 13.5 volts whilst the 13-volt potential at the emitter of 8TR5 is maintained.



When the PHONO button is again operated, the voltage at the cathode of 8D6 again leaps to approx. 6.5 volts. 8TR5 is forward biased, the collector goes high, 8IC2 is forward biased and the collector of 8IC2 is short-circuited to chassis potential. There is a connection from the collector of 8IC2 to the rise/lower switch in the Beogram 4004 so that the pick-up arm rises and thereafter lowers when the PHONO button is again depressed. The anode of 8D9 is connected to the START section of the electronic switch and therefore is high during inward slide transport. This causes 8D9 to be forward biased. 8TR8 will then likewise be forward biased, and the base of 8IC2 is short-circuited to chassis potential. Manual pick-up arm rise/lowering therefore cannot be performed during inward slide transport. The anode of 8D10 is similarly connected to the STOP section of the electronic switch so that manual rise/lowering cannot be performed during outward slide transport either.



While a record is being played, 8TR2 is forward biased, the collector is low and 8TR3 reverse biased. Because of the voltage divider 8R4 - 8R5, 8C3 is charged to approx. 6 volts. When a change to another program is made on the remote control unit, the 13-volt potential at pin 4 of P9 disappears, 8C3 will discharge through 8R5 and 8R7, causing 8TR1 to be reverse biased.

The collector of 8TR1 goes high and 8TR3 is forward biased. The collector of 8TR3 is connected to the STOP contact through pin 8 of P10, and with a low level at the collector of 8TR3 the pick-up arm will rise and slide return. The base of 8TR2 is connected to the rise/lower section of the electronic switch through pin 9 of P10 so that when the pick-up arm is in its lifted position, 8TR2 is forward biased, and the base of 8TR3 is short-circuited to chassis potential. Hence, 8TR3 cannot be forward biased when the pickup arm is in its lifted position, and the slide therefore will not return if a change is made to another function on the remote control unit.

In normal operation, + 13 volts from the Beomaster 2400 is applied to the cathode of 8D3 (in the PHONO mode through 2D61 and in other program modes through 2D60). 8TR4 is reverse biased with approx. 5 volts at the emitter and 8C2 is fully charged. When the STAND BY button on the remote control unit or the radio set is operated, the + 13-volt potential from the radio set goes to 0 volts, and 8TR4 is forward biased. The emitter of 8TR4 goes low, and 8C7

will discharge such that a negative voltage appears at the cathode of 8D4. 8D4 and 8D5 receive forward bias, and the STOP section of the electronic switch is activated, the pick-up arm rises, and the slide returns.